

**PERCEPTION OF FARMERS' ON CONTRACT FARMING AS A RESPONSE TO CLIMATE CHANGE ADAPTATION
IN ETHIOPIA: EMPIRICAL EVIDENCES FROM TWO DISTRICTS OF OROMIA REGIONAL STATE**

Getachew Megersa and Engdawork Assefa

Center for Environment and Development Studies, College of Development Studies, Addis Ababa University.
Addis Ababa, Ethiopia

ABSTRACT

The main purpose of this paper is to assess the perceptions of farmers' on contract farming as a response to climate change adaptation in Ethiopia: empirical evidences on Malt Barley contract farming and Sugarcane outgrower arrangements. Data on farmers' perceptions were collected from a sample of 383 farmers selected through proportionate random sampling. Household survey substantiated through focus group discussions, key informant interviews and field observations were data gathering instruments. Software Package for Social Science (SPSS), Version 20 software were employed to analyze data collected through Likert Scale measurement. Results revealed that participant farmers' have better understanding on overall aspects of contract farming as compared to those non-participant farmers' working in contract farming. Therefore, the agribusiness firms and cooperatives should focus on lifting up farmers' understanding on contract farming; provide trainings and technical assistance, which in turn has positive impacts on sustainability of contract farming and livelihood in the study areas.

Keywords: Climate change adaptation, Agribusiness firms, Contract farming, Household survey, Perceptions, Likert scales, Sustainability, Software packages for social science

INTRODUCTION

Background of the study

Agriculture is the main stay of an economy and a source of livelihood for many smallholder farmers¹ in Ethiopia. Subsistence farming is a typical farming system, which is very common with a mixed type of agriculture comprising of crop production, livestock rearing, vegetables and fruit production. Thus, it is very essential to include small Scale farmers² into agricultural value chains in Africa (Little & Watts, 1994; Oya, 2012; Prowse, 2012; United Nations Conference on Trade and Development (UNCTAD, 2009) by transforming agriculture from subsistence, traditional farming system to modern agricultural commercialization. Malt Barley is one of the commercial crops with high potential, market oriented and integrated into value chain development as contract farming³ arrangement in Kofale district of West Arsi Zone of oromia Regional State. The contract was between agribusiness firms and the cooperative unions. The government of Ethiopia seeks to address the growing domestic and international demand for sugar and to earn foreign currency on sustainable basis; Wonji Shewa Sugar Factory incorporated the farmers' farmland into the contract scheme as outgrowers. Similarly, recent initiatives considered by Assela Malt Factory, Diageo and Heineken creating market linkages and a network for farmers' and cooperatives to ensure sustainable and reliable supply of Malt Barley for Malt production by Ethiopian Agricultural Transformation Agency (EATA, 2016). It was with this intention that the SHFs at Kuriftu Hida and Adulala Hake were engage in the contract arrangement in East Shewa Zone of Adama district.

Accordingly, the Malt Barley CF at Kofale district was started its production in 2014 G.C (Gregorian Calendar) and the Sugarcane CF at Kuriftu Hida and Adulala Hake entered into the contract scheme in 2008 and 2011 G.C, respectively. One of the major aim of the government of Ethiopia to start and expand the Malt Barley CF with the private sectors: Meta Diageo, Heineken, Self Help Africa, Agriterra, SNV (Netherlands Development Organization). Further, Technoserve and GMS⁴ Ethiopia were to fill the production gap created in malting Malt Barley at Assela Malt factory and create market linkages on sustainable circumstances for farmers. Thus, the need to meet the brewing industry's increasing domestic demand and the national stance to replace barley and malt imports, which is a major expense for the country (with \$9m in imports of raw Malt Barley and \$40m+ in annual imports of Malt). Furthermore, because of the presence of competition among the processors to increase Malt Barley production through CF, providing resources (EATA, 2016)⁵, inputs and other extension packages were to address the rapid growth of beer consumption (i.e. 15-20%). On the other hand, the growing demand for Sugar at local market and international level brought forth the Ethiopian government to expand Sugarcane farm creating a

1 This paper uses the term "smallholder farmers" and "farmers" interchangeably and used to represent the sampled households that are termed as "participant farmers in contract farming and non-participant that are not participant in CF".

² The term small-scale farmers are used quite loose, to denote two characteristics, having limited farming areas and not having the resources to invest in expanding the farming practice on their own. These households are typically average to poor households in a community. According to this study, they have farmlands less than five hectares.

³ This paper employed "contract farming" as "CF".

⁴ "GMS" refers to a Global Malting Service engaged in consultancy service in Malt Barley production at Kofele District.

⁵ EATA this refers to the Ethiopian Agricultural Transformation Agency established to support the agricultural transformation of the country. It takes into account the comparative advantages of the areas preferably regions based on their resource endowment.

platform for the factory to incorporate the farmers' in the surrounding locations of Wonji Shewa Sugar Factory (Adama District Rural and Agricultural Development Office, 2007).

The main aim of this study is to assess the farmers' perception on CF as climate change adaptation strategies in two study areas namely: Kofele District (i.e. Germama Peasant Association engaged in Malt Barley CF) and Adama District Wonji Shewa Outgrowers: (i.e. Kuriftu Hida and Adulala Hake Peasant Associations engaged in Sugarcane CF). The study has used household survey, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) to expose information from the participant and non-participant farmers' as opposed to the studies by (Ayelech, 2012; Ayelech, 2010; Nijhoff & Trieneksen, 2012; Nijhoff, 2010 and USAID, 2012) done through qualitative studies and review approaches (Prowse, 2012). The current study (i.e. our study) employed a mixed approach namely quantitative approach (i.e. household survey) and qualitative approach (FGDs, KIIs) to investigate the perceptions of SHFs on CF as climate change adaptation strategies in Ethiopia: empirical evidences from Germama (i.e. Malt Barley CF), Kuriftu Hida and Adulala Hake (i.e. Sugarcane CF). There are limited study done in Ethiopia (Ayelech, 2010; Nijhoff & Trieneksen, 2012; Nijhoff, 2010; Prowse, 2012; USAID, 2012) in particular and the world in general (Strohm & Hoeffler, 2006). Many of these studies conducted in Africa, Asia, Europe, Central America, USA, East Asia and other parts of the world focused on the vertical coordination of CF, CF theory and practice, Linking agri-business and farmers, and so on. However, none of these investigations dealt with the perception of farmers' on CF as climate change adaptation strategies. Thus, there are lack of empirical investigations and scientific evidences carried out in Ethiopia on the farmers' perception regarding CF as climate change adaptation strategies in general and other aspects of contract farming in increasing the income of farmers' in Ethiopia in general the study areas in particular. Moreover, there were no studies conducted to examine farmers' perception of on the contract specifications, the role of the government in contract farming, the role of private sectors on contract farming, the relationship between CF and climate change adaptation strategies (CCASs) with the ultimate goals in improving the livelihoods of farmers and ensuring food security and sustainable livelihood.

Therefore, this study is the first of its kind to shed some lights on the problem under investigation employing a mixed research approach or design. Therefore, it is paramount important to assess the farmers' perceptions on CF as climate change⁶ adaptation in the study areas, fills these knowledge gaps and contribute to sustainable agriculture. Consequently, this paper would contribute in filling this knowledge gaps, add some new finding in the area of CF as climate change adaptation strategies (CCASs)⁷ literatures and forward policy recommendations with respect to the perception and knowledge pertaining to CF as CCASs.

⁶ Climate change refers to a change in one or more climatic elements or stimuli such as rainfall, temperature, relative humidity manifested through drought, floods, snowfall, and change in planting of sowing date and so on.

⁷ Climate change adaptation strategies termed as "CCASs" are strategies that the farmers' employed to curb the impacts of climate change by building local specific adaptation strategies in the study areas. For example: Soil and water conservation, use of local landraces, improved varieties of seeds, use of Ayber BBM and so on.

A CONCEPTUAL FRAMEWORK

CF as agricultural practices and CCASs depends on understanding of the sustainable livelihood context of farmers. Farmers' perception on CF as climate change adaptation laid a foundation to perceive the contribution of CF, overall farmers' livelihood and its relationships with agribusiness firms. Moreover, this requires understanding of farmers' situations and strategies or choices to curb climate change. This is why they are participating in CF and engaged in CCASs. As evidenced in (Bijman, 2008; Eaton & Shepherd, 2001; Minot, 2011; Prowse, 2012; USAID, 2012) CF practices creates opportunities to access factors of production such as land, capital, labour and time, which are the cornerstones for sustainable agriculture, the farmers' and agribusiness firms in commercial agriculture (FAO, 2018). However, the CCASs employed by the farmers and the inputs for CF practices, rely on the same and similar resources that serve to build their adaptive capacities and contribute to the transformation of structures and processes in CF and sustainable agriculture. In his regard, CF may serve as a base for adapting to the changing climate in the study locations. Therefore, this study modified and relied on the conceptual framework employed by Carney (1998) and that of Ziervogel (2003) to understand the perceptions of farmers on CF practices, the climate change adaptations employed by farmers' in the study areas.

In the context of this study, the success of farmers' depends on the way they perceive CF and links it with climate change adaptations. Moreover, production inputs such as finance, technical knowledge, new production techniques, agricultural technologies and channeled skills towards agricultural commercialization Oromia Agricultural Transformation Agency (OATA, 2016) serve as a cornerstone for sustainable CF practices. Further, perceptions related to CF problems such as side marketing, delay in time, improper application of agronomic practices, pre-harvest and post-harvest losses affect the effectiveness of CF as CCASs and sustainable agricultural commercialization. On top of these, there are other factors such as institutional set ups, organizations, soil and water conservation practices, incentives, policies and legislations that shape CF practices, farmers' livelihood, food security and climate change adaptation options (Getachew, 2012). Moreover, it also looks the institutions and processes that operate from the lowest level (household) to the national level and at all spheres from NGOs, private to the public that determines access to livelihood assets, livelihood activities, livelihood strategies and outcomes likely influences CF practices and climate change induced hazards.

Different CF practices, CCASs and all the necessary assets or inputs as described above would affect the successes of CF schemes as CCASs and sustainable agriculture. The various livelihood choices because of CF schemes as climate change adaptations employed, further enhances the adaptive capacities of households, individual farmers, institutions both at government and NGO levels and immensely contribute towards sustainable agriculture. It also supports private agribusiness firms to achieve their goal successfully and build up virtuous circle of the continuum in overall CF processes. As depicted in figure 1 below and clearly indicated in Ford et al. (2006), the nature and concerns of farmers, their location, structure and culture impacts CF practices and successful implementation of CCASs. The comparative advantages and the new OATA strategies (i.e. cluster formation: Agricultural Commercialization Cluster based on local agricultural endowment) induced commercialization of agriculture in the study areas (OATA, 2016). For example, adoption of new technologies those have the capacity to boost agricultural production, improve the existing markets creating new markets that benefits both the agribusiness and farmers' from CF practices (Ayelech, 2012 & 2010) to facilitate CCASs in the study areas in particular and Ethiopia in general.

Fortunately, one of the advantages of the perceiving CF scheme in the face of CCASs is to enhance the adaptive capacities of farmers and increase the potential abilities to address, plan for and curb the changing climate and reduce the influences of factors that hinders the successful implementation of CF scheme and CCASs. It is through these gained experiences and better ways of handling problems related to CF practices that are making a plain ground for providing solutions for CF problems, the changing climate and build a sustainable ground for commercial agriculture. The adaptive capacities are the major characteristics of the human system including economic wealth, social capital, infrastructure, social institutions and experiences supports and address CF related problems and challenges resulted from climate change. Furthermore SHFs on the wide range of technologies such as: new varieties of improved seeds, combine harvesters (Threshers), Ayber BBM⁸ etc, determines the successful implementations of CF schemes as adaptation to climate change in the study areas. These factors facilitate or constrain the ability of farmers, extension workers, agricultural experts, cooperatives or a community to deal with climate related hazards (Adger, 2003a; Barnett, 2001; Handmer, et al., 1999; Robards & Alessa 2004; Smith, et al., 2003). These determinants are interdependent and influenced by human and biophysical conditions and processes operating at various scales from local to global level.

⁸ Ayber BBM is a broad bed furrow maker and refers to a ploughing agricultural technology used to drain water from the farm field (i.e. from black solanchak soil).

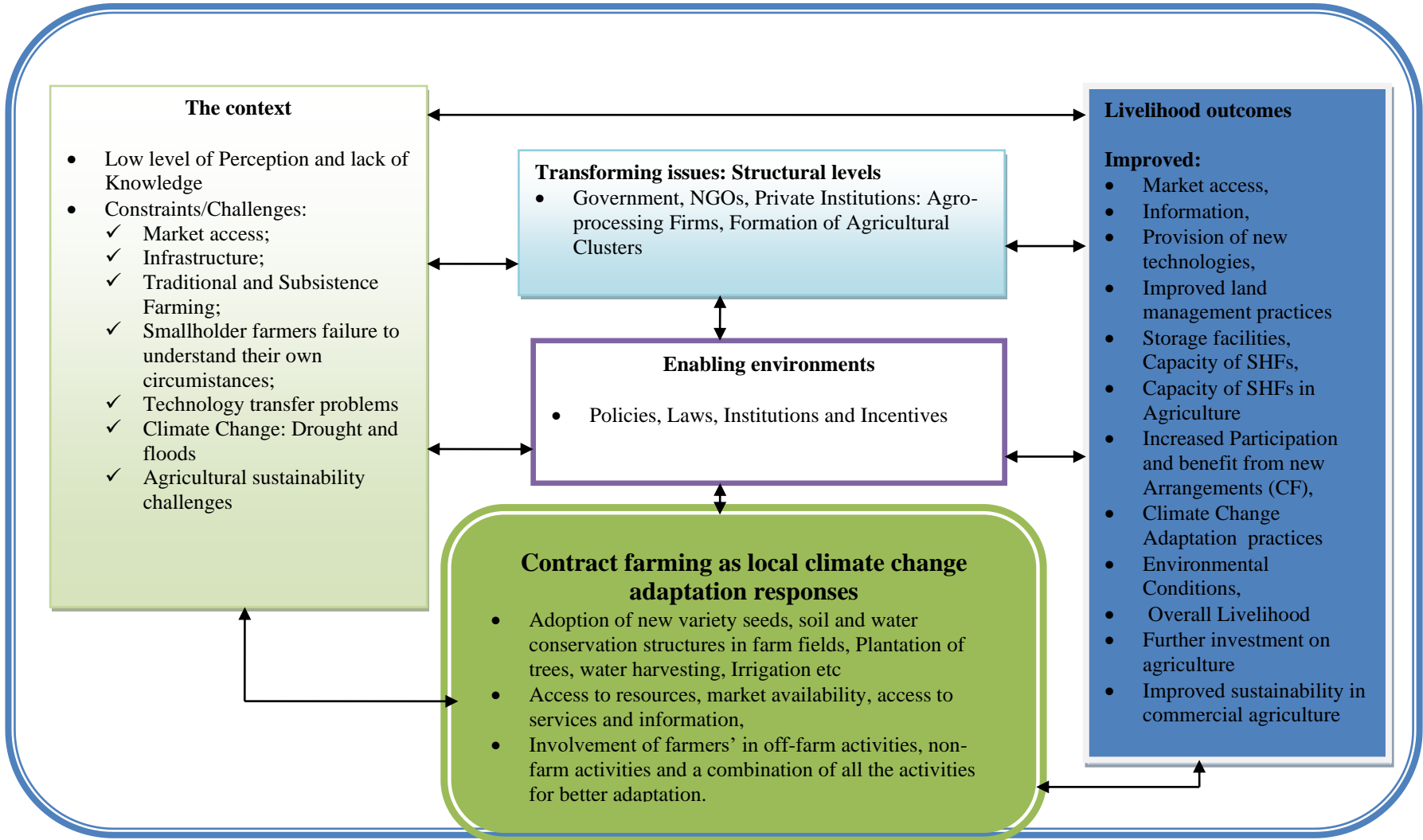


Figure 1 A conceptual framework linking contract farming, climate change adaptations and livelihood choices

Source: Modified from Carney (1998) and Ziervogel and Calder (2003)

EMPIRICAL STUDIES ON CONTRACT FARMING: AFRICAN AND ETHIOPIA EXPERIENCES

African experiences on contract farming schemes

The CF experiences in African countries such as Tea and Sugarcane CF in Kenya, Cotton y in Zimbabwe, and Palm Oil CF in Ghana may serve as a springboard in this study. These companies managed large CF schemes with many out growers in their respective countries. In contrast to Ethiopian experience in CF schemes on different agricultural products, the CF scheme experiences in other African countries dated back to 1964 the Kenyan Tea Development involving 600,000 farmers cultivating an aggregate of 109,000 hectares till 2010 (USAID, 2012). Similarly, the Zimbabwe Cotton Company was a public enterprise established in 1969 and was the largest Company started its CF schemes in 1992. Ghana was another African country known for the largest palm oil producing company in Africa established in 1975 and known for its CF schemes in West Africa.

Ethiopian experiences of contract farming

CF in Ethiopia is becoming one of the major tools in transforming subsistence farming, export oriented high value agricultural production, and address the questions of sustainable agriculture on sustainable basis. Available empirical evidences such as explained in Prowse (2012) and USAID (2012) clearly underscored that there are successes and failures in CF arrangements in Ethiopia. Prowse (2012) emphasized that, in a selected value chain such as Coffee, Sesame and Haricot Bean, it was not allowed to enter a contract arrangement for these agricultural items; rather it is the Ethiopian Commodity Exchange⁹ responsible for making it right. It was only through this organ that these commodities transaction take place. ECX assures all commodities marketing actors the security they need through provision of a reliable, integrated system for handling, grading and storing commodities, matching offers and bids for the commodity transactions. ECX system is a risk free payment and goods delivery system to settle transactions, while serving all fairly and efficiently (USAID, 2012). Consequently, to the coffee marketing proclamation, the Sesame and White Pea Beans transactions or trading in Ethiopia have conducted only at primary transaction centers (Ayelech, 2010).

The exploratory research by Nijhoff & Trenseken (2012) also had undertaken research on “Critical factors for CF arrangements: the case of Ethiopia”. From this study, there are lessons learned and gained experiences, where CF is important for farmers in the study areas in particular and for Ethiopia, in general. It served as agricultural commercialization and sustainability instrument to enhance export earnings, input provisions, opens up financial sources, knowledge transfer, technology transfer, a means of ensuring food security and improving agriculture on sustainable ground. The empirical evidence indicated in Ayelech (2012 & 2010) and USAID (2012), the government of Ethiopia sees CF as an important element in sustainable agricultural commercialization tool to enhance export earnings, increase agricultural income of farmers facilitated knowledge transfer and helps to ensure food security conditions. Even though there was little experience in policy arena in Ethiopia regarding CF, in the Ministry of

⁹ “ECX” is Ethiopian Commodity Exchange (ECX) established under the Proclamation No. 550/2007 in 2007 and become operational in April 2008 authorized to handle all the matters pertinent to these selected value chains such Sesame and White Pea Beans Transaction Regulation No. 178/2010 mandates that sesame trading in Ethiopia conducted only at primary transaction centers.

Finance and Economic Development (MoFED, 2007) and PASDEP¹⁰ (2005) the Ethiopian government expressed its deepest concern and taking CF as a key in improving export values. Farmers' adoption of CF as a strategy of livelihood improvement and ensuring food security is another greater opportunity for farmers to access both domestic and international market through the network formation with private and NGOs. Furthermore, what is lacking in CF literature did not consider CF as CCASs.

Prior to 1991's

The history of CF in Ethiopia dated back to the establishment of the Ethiopian Seed Enterprise (ESE) primarily for production of Wheat and Teff. As indicated in USAID (2012), ESE has its own farm, entered in to large-scale commercial farming, and worked with farmers for more than three decades. According to Yonas, et al. (2008), the use of contract seed production by ESE dated back to 1980s during the planned economic system by Derg Government. The contract was with seed-producing scheme with farmers' group approach (i.e. producers' cooperatives). The contract agreement was between cooperatives and the ESE where quality of the seed produced was the key aspect in the CF agreement. USAID (2012) documented that the cooperatives were fully responsible for honoring the contractual agreement for seed production by its members. To realize this, farmers who were the members of the cooperative obliged to merge their plots and form longer clusters, which were convenient for field management. The produced seed was stored in the cooperative storehouse until tested. During this period, ESE was responsible for transportation of the seed produce from cooperatives to the ESE centers. At the ESE centers, the standard monitoring procedure applied was seed cleaning, grading and packaging. The quota system and fixed pricing strategy was the rule of the system and the contract was based on the viability and sustainability of the seed production systems (USAID, 2015 & USAID, 2012)

From 1991 to the present

After 1997, CF arrangements with farmers' closely related to the implementation of five-year Seed Systems Development Project in Ethiopia, focusing on Farmer Based Seed Production and Marketing Scheme (FBSPS) financially supported by International Development Agency (IDA), International Fund for Agricultural Development (IFAD) and the Government of Ethiopia during 1997-2001 (USAID, 2012). The major aim of the project was to engage farmers and support them in sustainable seed production and income generation by providing farmers with the necessary materials and inputs required including credits, training of farmers, extension workers, testing and implementation of small-scale seed cleaning facilities as a pilot project by the previous Ethiopian Seed Industry Agency.

CF arrangement of the ESE has considered as a pioneer in starting up the CF schemes with cooperatives during Derg Regime, the SHFs become successful, and increased the awareness of the farmers. As emphasized in Yonas, et al., 2008; USAID, 2015; USAID, 2012), most of the contractual schemes was sustainable and ended up with certification of seed production. The arrangement it-self involves the formal agreement between the ESE and the

¹⁰ PASDEP refers to "a Plan for Accelerated Sustainable Development to End Poverty 2005/06-2009/10" designed to address the overall development challenges of the country representing the second phase of the Poverty Reduction Strategy Program (PRSP) process, which has begun under the Sustainable Development and Poverty Reduction Program (SDPRP).

individual farmers stipulating the obligations of all parties. The contractual stipulated was so strong and geared towards provision of trainings, technical support, basic seed or certified seed for multiplication and raw seed packaging materials. More importantly, the technical support includes supervision, training on crop management and quality control, flexible pricing strategy with 15% premium price as incentive as well as field inspection and laboratory tests (USAID, 2012).

Another study by Nijhoff (2010) clearly put that the CF schemes in Ethiopia was at their infant stages. However, based on the inventory he made, the schemes such as EHPEA (Ethiopian Horticulture Production Enterprise Association) Vegetable Company, Beza Mar Agro-Industry Private Limited Company, Solagrow Seed Potato Company, AfricaJuice, Passion Fruit Juice, Tradin (Selet), Organic Sesame, Tired Barley, EthioFlora, Horticulture and Asella Malt Factory were among the successful agribusinesses in Ethiopia. Despite their maturity, these agribusiness firms were building a strong base for the successful function of the firms especially Assela Malt Factory were executing their tasks as per the contractual agreement they made with the farmers. However, transparency and accountability issues of these companies were the critical elements that require in depth investigation.

There were also agri-business firms that failed in their contractual schemes. First, Soreti International Trading Company, Oil Seed and Pulses producing company engaged in the production of oil Seeds and Pulses Trading. Second, Acos Trading Company and Pulse, which were a joint venture between Ethiopia and the Italian investors, penetrated the European Union (EU) markets with high quality produce of haricot beans, chickpeas, lentils and other pulses. Both these companies failed to function because of poor management schemes they followed: due to side selling and information gaps created between the agri-business firms and the farmers engaged in the contract agreement. That of Ethiopian CF schemes did not focus on sustainable agricultural production and market.

In conclusion, as compared to Ethiopia, the CF scheme in other African countries such as Kenya, Zimbabwe and Ghana have much experience in CF schemes (assigning expertise, capacity building and trainings) and their focus on agricultural commercialization and sustainability of their products. Moreover, the management of CF schemes (i.e. supervision of the schemes by the companies, pest management, producing agricultural products with good quality and quantity, bonuses, good at preventing side selling and risk sharing) had been far better than that of Ethiopia. Other African countries have strong implementation capacities (knowledge, skills, technical assistance and trainings) in managing the CF practices and designing contractual agreements and gained many lessons from CF practices. However, those of Ethiopia still are in their early stage of development and require drawing some lessons from these African countries for better design of CF arrangements and its implementation based on the “win-win model”, which have had a bearing on sustainable commercial agriculture, sustainable production and sustainable market as well. Moreover, the timely provisions of the necessary inputs such as: fertilizers, agrochemicals, improved seed varieties, technical assistances are required for the successful operations and sustainability of CF in terms of economic returns for agri-business firms, farmers and a mechanism to ensure food security for farmers engaged in the schemes CF arrangements.

MATERIALS AND METHODS

Description of the study areas

Kofale district (6°50' N - 7°09' N and 38°38' E - 39°04' E) is located in the West Arsi Zone, Oromia National Regional State of Ethiopia. Kofale district consists of a total area of 720Km², which is equivalent to 72,000 hectares and located 25Kms away from the Zonal Capital, Shashamene. It has a total population of 179,508: out of these, 90,000 were males and 89,508 were females (Kofale District Finance and Economic Development Office, 2007). Agriculture is the main stay of the District's economy. Around 95% of the population was engaged in various agricultural activities to generate income for their families. It is only 5% of the people engaged in other forms of livelihood such as petty-trade and other non-farm activities.

Wonji Shewa Sugar Factory is another study area located in Rift Valley, Adama district in Eastern Shewa District of Oromia regional State of Ethiopia. It is found in 8°20'0"N - 8°28'0" N and 39°12'0"E - 39°16'0"E East longitude. The topography of the factory is within 1500-2300 m.a.s.l and dominated by the surging plains that involve extensive ridges all along the western boundaries (Tadesse, et al., 2013). Most of the portion of the factory is situated in sub-tropical agro-climatic zone. Very flat and regular land characterizes Wonji-Shewa having a general slope varying between 0.02-0.05 percent (Dinka, et al., 2013). It is one of the densely populated districts in East Shewa Zone (CSA, 2008). The total Population of Adama District was estimated around 155,321. Among these, 16.9% of the population lives in urban areas, while 83.1% are rural population (CSA, 2008). The district has more than 43 PAs¹¹. Wonji-Shewa is the only Sugarcane outgrower schemes found within upper Awash River Basin, Central Rift Valley of Ethiopia.

¹¹ "PAs" represents "Peasant Associations" which refers to the smallest administrative units below district.

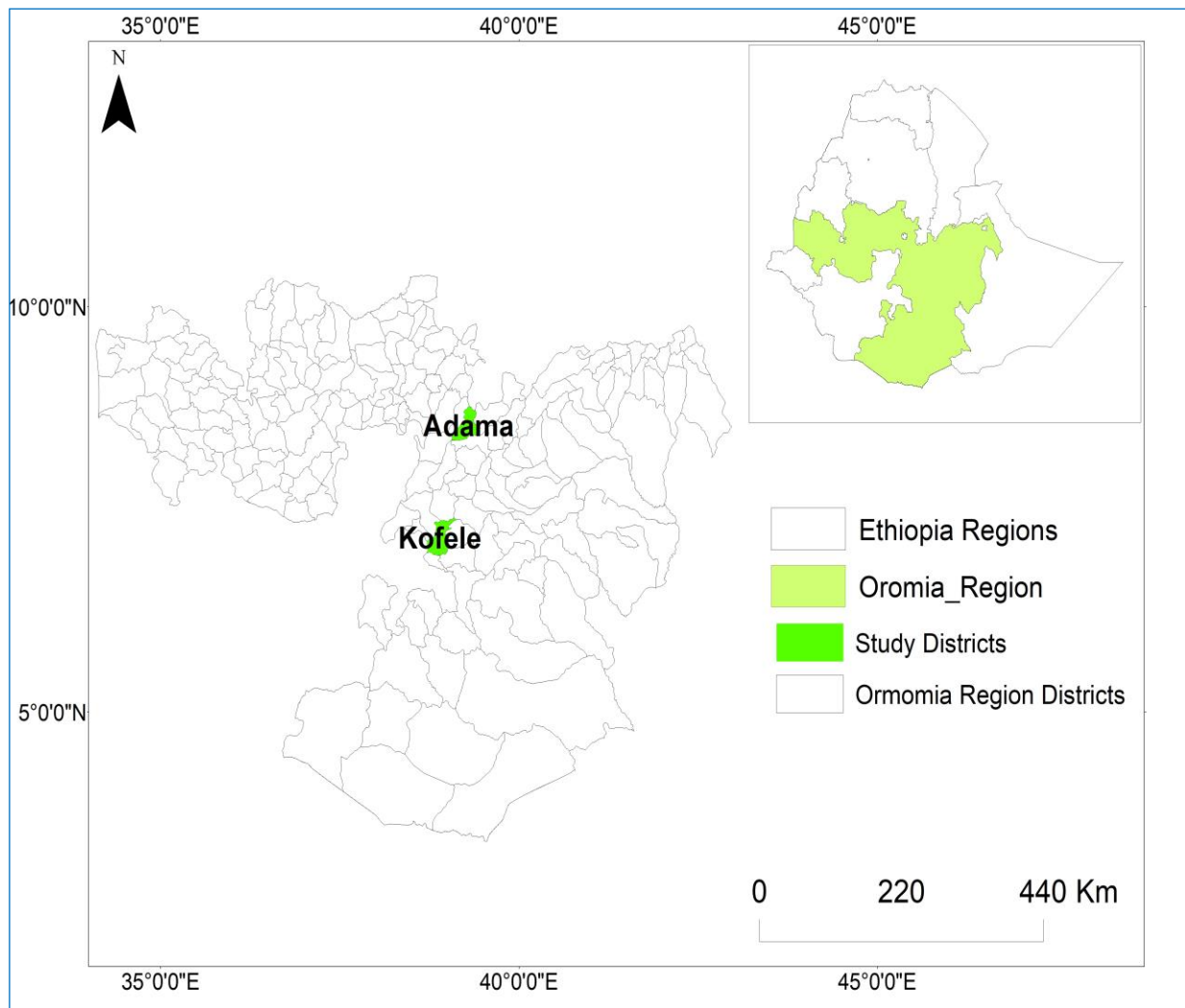


Figure 2 Map of the study areas

Source: Own Construction, 2010

Methods: sampling and data collection

The researcher employed household survey, FGDS and KIIs to gather data from the sample households, farmers who are engaged in Sugarcane farming and those non-participant farmers' in two Districts: Kofale (i.e. Malt Barley CF) and Adama (i.e. Wonji Shewa Sugarcane Outgrowers). In general, 383 farmers' were surveyed in the study areas. The three study PAs in the two Districts, namely: Germama , Kuriftu Hida and Adulala Hake were selected purposively from West Arsi Zone, Kofale district and from East Shewa Zone, Adama District, respectively, based on the their production history. The household surveys on the contracted and non-contracted farmers from the PAs carried out were selected randomly from the sample frame or lists obtained from the PA office during the first visit and carried out in the study areas. Moreover, *Six FGDS* each group comprising ten (10) participants, *more than 20 KIIs* from various government and NGOs and field observations were conducted with the contracted and non-contracted smallholder farmers to substantiate the household survey data. Moreover, the primary data obtained through household survey were supplemented with the data collected from secondary sources. Here, the unit of

analysis was the sample head of households engaged in CF (participants)¹² and not engaged in CF (non-participants)¹³. Finally, the required numbers of sample households were proportionately selected from farmers engaged in Malt Barley and Sugarcane CF and those of non-contracted ones as depicted in figure 3 below.

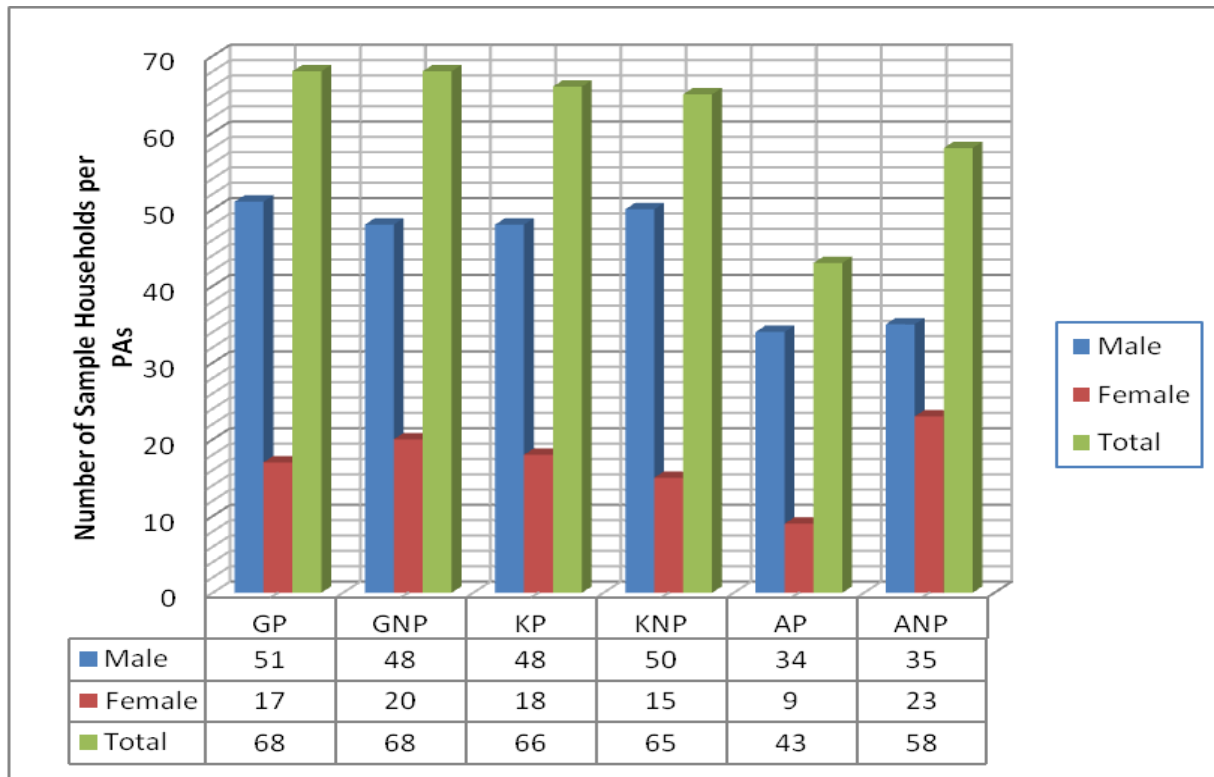


Figure 3 A graph of sampled households

Source: Kofale and Adama District Agricultural Office, 2010

This perception studies were carried out on six important aspects of CF with major focus on farmers’ perception on CF as climate change adaptation strategy for livelihood improvement and a mechanism to ensure food security. These are general aspects of CF practices, CF specifications or design, government role in the contract system, the role of private sector, CF and climate change adaptation nexus: and contract farming as a livelihood strategy and ensuring food security. This study was a part of household survey conducted from January 2018 to August 2018 to understand the relationship between Malt Barley and Sugarcane CF practices as climate change adaptations at Germama, Kuriftu Hida and Adulala Hake Haroreti, respectively.

Data analysis and interpretations

The primary data collected from farmers’ on farmers’ perception on CF as climate change adaptation strategy for livelihood improvement and a mechanism to ensure food security were measured through Likert Scale Measurement (LSM) and analyzed through descriptive statistics: such as frequency, mean and standard deviations using Statistical Packages for Social Science (SPSS Version 20). The descriptive statistics were employed to describe *farmers’ perception on overall aspects of CF, contract specifications, and roles of the government on CF, roles of private*

¹² “P” denotes “Participant farmers in CF arrangements

¹³ “NP” refers to those “Non-participant farmers in CF

sectors or development partners on CF, the link between CF and climate change adaptations and the CF as a livelihood improving strategy and a mechanism to ensure food security in the study areas.

To this end, there were totally 58 items in the instrument explaining the various aspects of CF and climate change adaptation in the view of improving the livelihood and a mechanism in ensuring food security of farmers in the study areas. The responses were collected on five point Likert Scale Measurement¹⁴ namely:- ‘Strongly agree’, ‘Agree’, ‘I don’t know’, ‘Disagree’ and ‘Strongly disagree’ by assigning 5, 4, 3, 2 and 1, respectively, on each of the items. The score of each item under different CF perceptions as CCASs were added to get the total score of the informants. Therefore, the minimum and maximum possible scores were 1 and 228, respectively. Based on the scores obtained in the survey, the overall perceptions of smallholder farmers the informants categorized into three groups as depicted in the following table.

Table 1 Likert scale measurement categories

Category	Criteria
Poor	< (Mean – ½ SD)
Average	Between Mean ± ½ SD
Better	> (Mean + ½ SD)

Source: Adapted from Tanweer, et al., 2018

In further analysis, the perceptions of farmers on CF as climate change adaptations were carried out by calculating the mean score for each item, which may have the minimum and maximum possible scores on each item were 1 and 5, respectively.

RESULTS AND DISCUSSIONS

This section starts with descriptive analysis of the socioeconomic characteristics of the sampled farmers’ engaged in Malt Barley and sugarcane CF in Kofale and Adama districts of West Arsi Zone and East Shewa Zone of Oromia Regional States. The perception studies focused on six important aspects of CF practices as CCASs. These includes: general or overall situations of CF, CF specifications or design, government’s role in contract systems, the role of private sectors in CF, assessments on the perception of farmers’ and the relationship between CF as climate change adaptation practices and CF in improving farmers’ livelihood and ensuring food security in the study areas.

Descriptive analysis

Socioeconomic characteristics on participation and non-participation in contract farming

Table 2 and 4 summarized the socioeconomic variables that are supposed to exert influence on the participation of farmers into contract farming. These variables were grouped into household characteristics, economic situations, farm characteristics and institutional factors that are very crucial in affecting contract farming, climate change adaptation practices and livelihood improvement.

¹⁴ Kothari, 2004: Likert Scale Measurement: it is a type of summated scales used to measure the perceptions of SHFs on CF based on five point scales: “Strongly agree’, ‘Agree’, ‘I don’t know’, ‘Disagree’ and ‘Strongly disagree’ by assigning 5, 4, 3, 2 and 1, respectively”

Household characteristics

Age of household is one of the socioeconomic factors that determine the participation of farmers in CF practices in the study locations. The mean age of farmers who participated in the survey is about 43.01 years with standard deviation of 12.25 at Germama. Similarly, the respondents at Kuriftu Hida and Aduala Hake mean age is 43.70 years with standard deviation of 12.09 (see table 2 below). The statistical analysis revealed that there is significant difference in mean age among participant and non-participant farmers. Genders of households greatly influence the participation of farmers into contract farming in the study areas. Therefore, it was estimated that 36.7% of the respondents participated in CF were male as compared to those 11.9% of female counter parts. With respect to non-participants, 34.2% of them were male and 17.9% of them were female. From this it is concluded that the majority of the participants and non-participants were male respondents and the Chi² test revealed that the difference in the participation of male and female were statistically significant at less than 5% ($p < 0.019$).

With regard to education status of households, most of the respondents at least reached 5-8th grade level and can read and write. However, the aggregate of 45.9% of participant households into contract farming at followed education level above grade 5 and this exceeds the non-participants grade level by 13.6%. The mean highest-grade level attained by those farmers in the overall is about 3.16 and 0.92 for all farmers at Germama, Kuriftu Hida and Adulala Hake and the Chi² result indicated that this is statistically significant at 5% level ($p < 0.000$). From this it is concluded that as level of education increases, the probability of participation in CF increases because the respondents with better education have better chance of knowing the benefits and advantages of CF as compared to those at lower grades. Hence, this study is consistent with (Strohm & Hoeffler, 2006), where the better the farmers educational level, the better the participant respondents understand the contract design, agronomic practices, market situations and other contract activities.

Regarding mean family size of the respondent farmers, the mean number of family at Germama was 6.87 persons with standard deviation of 1.49 and 6.51 persons with standard deviation of 1.64 for Kuriftu Hida and Adulala Hake, which is higher than the mean family size of the national average (4.2 persons per household) (CSA, 2007). However, it has been reported that there was significant difference between the family size of participant and non-participant respondent farmers. As depicted in the table 2, the respondents at Germama have relatively exhibited large family size and there was significant difference among the study participant and non-participant stallholder farmers among the study peasant associations.

Table 2 Description of socioeconomic characteristics of respondents by peasant associations

Variable	Germama (N=136)		Kuriftu Hida and Adulala Hake(N=232)	
	Mean	Std. Dev.	Mean	Std.Dev.
Mean age of HHs	43.01	12.25	43.70	12.09
Mean of education of HHs	3.16	.79	2.22	.92
Mean of family size of the HHs (number of persons in the HHs)	6.87	1.49	6.51	1.64
Mean of wage labour(man/day/year in ETB Birr)	3415.44	882.38	2732.52	584.61
Mean of Livestock in TLU	7.72	5.38	5.60	4.72
Mean of Malt Barley production (Quintals/hectare)	46.88	8.08	2.85	.57
Mean of Sugarcane production (Quintals/hectare)	-	-	113.73	95.02
Net income per year in ETB Birr	31,082.94	5,199.38	21,784.7	15,733.52
Farming experience in years	1.90	.31	2.32	.57
Farmland size in hectares	1.86	.85	1.72	.69
Access to nearest markets in hours	1.35	.48	1.34	.67

Source: Own Survey, 2018

Economic characteristics

Income of households is a cornerstone for any agricultural activities in Ethiopian. This includes the overall income obtained from agricultural activities, off-farm activities, non-farm activities and combinations of two or all of them. Consequently, the participant respondent households got a mean income of 31,082.94 ETB per year with standard deviation of 5,199.38 as compared to those non-participant respondent households who obtained a mean income of 21,784.70 ETB per year with standard deviation of 15733.52. The Chi² result revealed that the income earning is statistically significant and different at $p < 0.000$ among the participant and non-participant respondents because of the fact that the participant households engaged in diversity of their income source.

Malt barley and sugarcane productions were the two major cash crops at Germama, Kuriftu Hida and Adulala Hake, respectively, measured in Quintals per hectare. Therefore, the respondent sampled households at Germama produce a mean of 46.88 Quintals per hectare with standard deviation of 8.08. Nevertheless, the sampled households at Kuriftu Hida and Adulala Hake produced a mean of 113.73 Quintals per hectare of Sugarcane with a standard deviation of 95.02.

With regard to Malt Barley production, the discussions made with FGDs and the interview held with KIIs at Germama and Asella Malt factory experts underscored that the standard or Grade level. The respective price depends on the moisture content of the grains, seed variety, grain size, residue contents of and other factors (Assella Malt Factory and BGI Ethiopia, 2017 and 2018). From this, one can conclude that the better the quality of Malt Barley, the better the price and the better the income earned from Malt Barley and incentives obtained. For further information, please refer to Table 3 below.

Table 3 Standards and criteria to select qualities of malt barley grains

Variety Traveller	Grade 1	Grade 2	Grade 3	Rejection or Corrective Actions
Criteria	Grade 1	Grade 2	Grade 3	
Screening:	0-4%	4-6%	6-8%	More than 8%
Underseive(<2.2mm)				Red or Black Kernels
Color	Normal	Golden, Grey or others	Golden, Grey or others	
Moisture Content	13.5%	13.5%	13.5%	More than 13.5%
Other Creal Grains (Max% by Mass)	0.5%	0.5%	0.5%	More than 0.5%
Foreign Matter	5%	5%	5%	More than 5%
Fusarium on Grains	0%	0%	0%	At least 1 Grain
Variety Purity	Min 97% of the distributed seed variety	Min 94% of the distributed Seed Variety	Min 91% of the distributed Seed Variety	Min 90% of other Seed Variety
Storage, Insects (Weevils etc)	None	None	None	Any Weevil or Storage insect
Smell	Normal	Normal	Normal	Musty or Abnormal Smell

Source: Assella Malt Factory and BGI Ethiopia, 2017/2018

Wage labor is one of the determining factors in the study areas measured in man per day per year. Accordingly, the respondent households at Germama paid mean income of 3415.44 Birr per year with standard deviation of 882.38 as compared to those respondents at Kuriftu Hida and Adulala Hake who paid 2732.52 Birr per year with standard deviation of 584.61 for wage labour. The mean wage labour for the study areas depicted a difference of 682.92 Birr and the wage labour was greater for the respondents at Germama who engaged in Malt Barley CF scheme.

Farming characteristics

Land management systems such as soil and water conservation, crop rotation, agro-forestry, mulching and other related practices were an integral part of sustainable agriculture in the study locations. It played a pivotal role in increasing the production and productivity of especially those participant respondent households at Germama. To this effect, 45.4% of participant sampled households engaged in land management systems followed by those non-users that accounted about 2.4%. On the other hand, only small proportions of non-participant respondent households that consisted of 5.9% relied on land management practices in the study locations. The majority of the non-participant respondents (i.e. 46.2%) were non-users of the practice. This further revealed that the participant respondents better engaged in land management systems as compared to non-participant ones. The Chi² test depicted that land management practice is significantly different for those participants and non-participant sampled households at ($p < 0.000$).

Livestock rearing is one of the important socioeconomic factors that affect the farming system among farming community. As indicated in table 2, the survey results pointed out that livestock is a major component of

socioeconomic pillar of respondents in the study areas. To this end, there were a mean of 7.72 TLU¹⁵ with 5.38 at Germama and a mean of 5.60 TLU with standard deviation of 4.72 at Kuriftu Hida and Adulala Hake, which clearly show that the TLU at Germama was greater by 2.12 TLU due to favorable and relatively good access to livestock feed. Another crucial farming characteristic was that affect the participation of farmers in CF. Accordingly, the mean farmland size for Germama was 1.86 with standard deviation of 0.85 as compared to those respondent farmers and reported with a mean of 1.72 with a standard deviation of 0.69. In this report, it revealed that there were a slight difference in farmland size among the respondents at Germama, Kuriftu Hida and Adulala Hake. Above all, the farmland sizes in the study locations were larger than the national average of farmland size, which is below 1 hectare (Amare & Simane, 2017).

Institutional Factors

Institutional factors such as access to credits, access to irrigation, access to market, use of fertilizers, agronomic practices availability of agricultural technologies and access to metrological information are the fundamental ingredient in determining the productivity of agriculture. As stated in FAO (2018), having access to quality inputs and access to credits are among the institutional ingredients responsible to raise agricultural production. Accordingly, the report revealed that despite the time, type, amount and application of extension packages in study areas, all the respondents depends on extension services in their agricultural activities. Thus, 45.4% of the participant respondents reported that they have access to extension services followed by those 2.2% who did not rely on extension, while 16.8% of the non-participant households replied that they employ extension services. The largest proportion of respondent sample households around 52.2% indicated that they did not employ extension service in the study areas. This clearly and further revealed that the largest number of respondent participant farmers in CF in one way or the other have access and use to extension services. The Chi² results further confirmed that there is a significant difference ($p<0.003$) among participants and non-participants in accessing extension services at their locality.

Access to credit and other financial lending facilities are very essential to enhance the ability of households in times of financial need. It is of course an important element in extension service packages and agricultural technology adoption in the view of increasing agricultural production and productivity. The need for access to credits was that it helped the sampled households in ensuring agricultural productivity through modern agricultural technologies such as farm inputs: fertilizers, improved seeds, modern farm mechanizations (combine harvesters, threshers) that have a power to boost agricultural production. In view of these, 43.8% of the participant respondents have access to credits followed by those 4.2% who do not have access to credits, while the remaining 47.3% of the sampled households have access to credits followed by those 4.5% non-participant respondents, who do not. However, the participant households have access to credits from various sources: agri-business firms through government organized cooperative unions as compared to those who have access to credits from private individuals and self sponsored.

¹⁵ Total Livestock Units (TLU) is measurement unit that helps to measure live heads of cattle with animal category and its conversion factor. Thus, according to Strock, et al. (1991): Calf=0.25 TLU, Heifer=0.75 TLU, Cow/Ox=1.00 TLU, Horse=1.10 TLU, Donkey =0.70 TLU, Sheep/Goat=0.13 TLU, Chicken=0.013 TLU, Bull=1.00 TLU and Mule=0.70 TLU.

Access to irrigation is paramount important in increasing the production especially in areas where rainfall is limited or absent. Thus, 33.2% of the participant farmers reported that they have access to irrigation and employ it in their farmland and used it in agronomic practice. Small proportions of the participants that estimated about 14.6% do not have access to irrigation. With regard to non-participant respondents, 16% of them relied on irrigation for their agriculture followed by those 20.4% of them who do not use irrigation. The Chi² result revealed that differences in access to irrigation are statistically significant among the users and non-users of irrigation ($p < 0.000$).

An agricultural activity without market means a soldier without gun and bullet. Access to market is among the institutional factors that immensely determine the success of any agricultural commercialization, especially in the case of CF arrangement. Consequently, 22%, 18.8% and 7.1% of the participant respondent households have access to market through local market, cooperative unions and brokers in the study areas, respectively. The non-participant respondent sampled households estimated about 51.1% followed by those small proportions that accounted about 1.2% were only accessed market through local or spot market and cooperative unions. This survey result confirmed that access to market is statistically significant among participants and non-participants respondents with Chi² test of $p < 0.000$.

Access to agricultural technologies is also one of the pillars of agriculture that helps to increase the production and productivity of farmers. Hence, 45.4% of participant respondent households indicated that they have access to agricultural technologies such as agricultural inputs including fertilizers, improved seeds, agro-chemicals, farm implements and other related technologies. However, only small proportions of participant households that accounted about 6.3% do not rely on agricultural technologies to increase their production. In the survey result, 35.3% and 16.8% non-participant respondents do have access to agricultural technologies and do not have access to agricultural technologies, respectively. The Chi² result further indicated that there is statistically significant difference in accessing agricultural technologies among participants and non-participant respondent households in the study locations ($p < 0.000$).

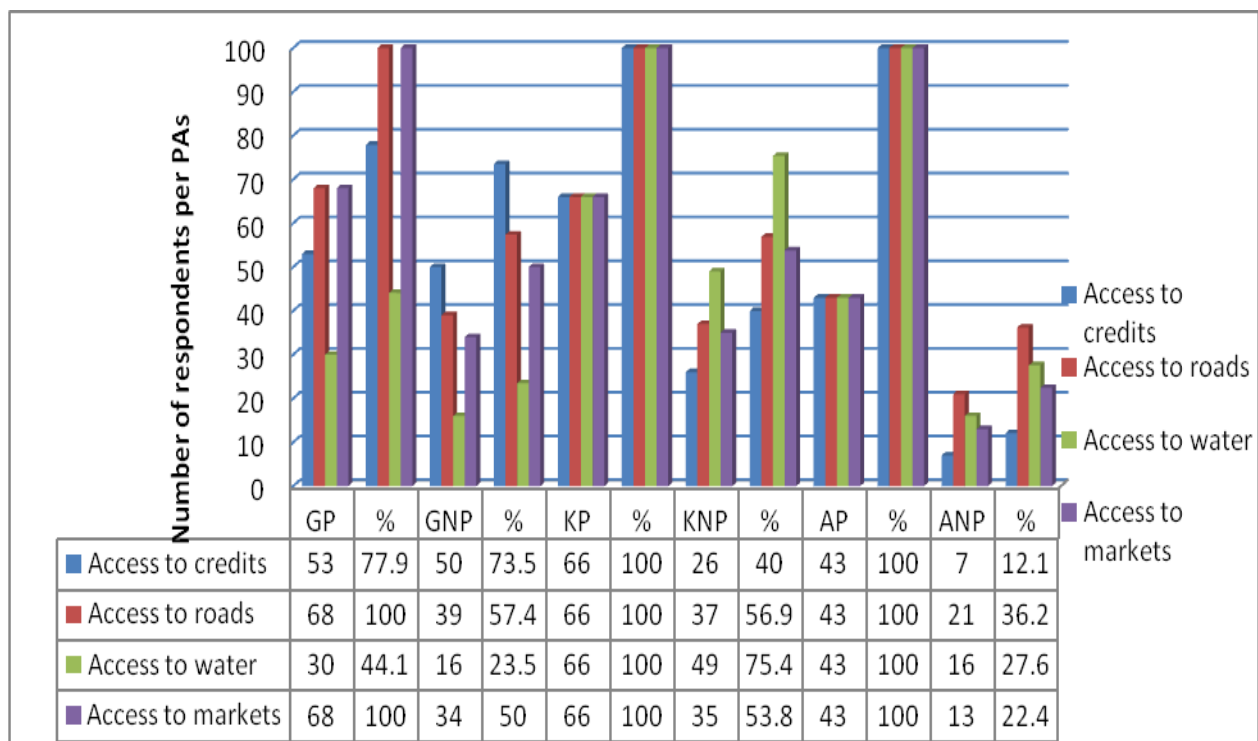


Figure 4 A graph of institutional factors affecting contract farming

Source: Authors construction, 2018

Access to metrological information is another important factor that affects agricultural activities in participating and not participating ones in CF arrangement. The survey result portrayed that from the total sampled households, 40.6% and 52.2% of the participant and non-participant respondent farmers, respectively, have access to metrological information through extension workers, television, radio and cell phones. However, only small proportions of participant that accounted about 6.3% do not have access to metrological information because of absence of television, radio and cell phones. The χ^2 result further revealed that there is significant statistical difference among participant and non-participant respondent households in accessing metrological information in the study areas ($p < 0.000$).

Table 4 Descriptive statistics of socioeconomic variables used in the regression model per farmers participation

Variables		Participants (176)	Non- participants (192)	Chi- Square	Sig.
PAs	Germama	68(18.5)	68(35.4)	1.543	0.462
	Kuriftu Hida	65(17.7)	66(17.9)		
	Adulala Hake	43(11.9)	58(15.8)		
Gender of HHHs	Male	135(36.7)	126(34.2)	5.466	0.019
	Female	41(11.1)	66(17.9)		
Age of HHs in Years	15-30 (Youth)	41(11.1)	26(7.1)	8.334	0.015
	31-64 (Early Elderly)	119(32.3)	155(42.1)		
	65 and above (Elderly)	16(4.3)	11(3)		
Education of HHHs	Illiterate	39(10.6)	18(4.9)	32.809	0.000
	Grade 1-4	45(12.2)	68(18.5)		
	Grade 5-8	73(41.8)	60(19.8)		
	Grade 9-10	15(4.1)	46(12.5)		
	Grade 11-12	4(1.1)	-		
Access to credits	Yes	161(43.8)	174(47.3)	0.082	0.775
	No	15(4.2)	18(4.5)		
Access to agricultural technologies	Yes	167(45.4)	130(35.3)	43.559	0.000
	No	9(2.4)	62(16.8)		
Access to extension service packages	Yes	168(45.7)	192(52.2)	8.921	0.003
	No	8(2.2)	-		
Access to markets	Local	81(22)	188(51.1)	125.981	0.000
	Cooperative unions	69(18.8)	4(1.2)		
	Brokers	26(7.1)	-		
Income in ETB Birr	Mean	24293.75	14310.77	171.164	0.000
Use of land management systems	Yes	167(45.4)	22(5.9)	255.841	0.000
	No	9(2.4)	170(46.2)		
Access to irrigation	Yes	122(33.2)	59(16)	20.024	0.000
	No	54(14.7)	75(20.4)		
Use of fertilizers	Yes	163(44.3)	124(33.7)	9.574	0.002
	No	13(3.5)	-		
Agronomic practices	Yes	160(43.5)	126(34.2)	12	0.001
	No	16(4.3)	-		
Access to metrological information	Yes	153(41.6)	192(52.2)	26.764	0.000
	No	23(6.3)	-		

Source: Authors, 2018

The respondents at Germama were engaged in malt barley CF unlike that of respondents at Kuriftu Hida and Adulala Hake, which were involved in sugarcane CF as a major crop in their area. Hence, the survey respondents at Germama produced a mean of 46.88 Quintal per hectare of Malt Barley and that of survey respondents at Kuriftu Hida and Adulala Hake harvested a mean of 113.73 Quintals per hectare. However, as one can understand from the survey result, as there is a difference in production per hectare, the mean income obtained from Malt Barley is by far greater than that of sugarcane producing survey respondents (i.e. Mean income of 9298.24 ETB Birr, which is 40.68% of the income obtained from Malt Barley).

Furthermore, based on the report of the participant and non-participant at Kuriftu Hida and Adulala Hake, all the participants at Kuriftu Hida (i.e. 68(100%)¹⁶ were access to credits, roads, water and market. The non-participant respondents that accounted about 26(40%), 37(56.9%), 49(75.4%) and 35(53.8%) respondents at Kuriftu Hida were access to financial services, roads, water and access to market, respectively. Even though they had access to these services, the amount of credits, types of roads, amount and type of water and market situations were different because of their proximity to towns, cooperative union stores and the Sugar factory. This study is consistent with the study conducted by Kirsten and Sartorius (2002) and they noted that CF creates an opportunity to access markets (i.e. market linkages) for farmers who were engaged in CF.

Regarding the participant and non-participant respondents at Adulala Hake, all of the participants (i.e. 43(100%)) of them reported that they were access to the services mentioned above. However, the non-participant sampled households estimated about 7(12.1%), 21(36.2%), 16(27.6%) and 13(22.4%) were access to the services, respectively. From the entire explanations, one can understand that the difference in access to services between the participant and non-participant respondents were emanated from services offered from the factory through cooperative unions and services from the sampled households' own source in the case of non-participant farmers.

Perceptions of farmers on Contract farming and climate change adaptations

Overall aspects of contract farming in the study Peasant Associations

The findings related to the perceptions on the general or overall aspects of CF of farmers engaged in Malt Barley and Sugarcane CF were portrayed in figure 3 for n=368. It could be seen that 46.2% (63) of farmers involved in Malt Barley at Germama were belongs to average perception category followed by those 33.9% (46) and 19.9% (27) categorized under better and poor perception category, respectively. Regarding farmers involved in Sugarcane outgrower, 81.5% (189) and 18.5% (43) were in poor and average perception category, respectively. From the findings, it was clear that famers in Malt Barley CF most of them that accounted about 80.1 % (109) of the respondents found to have average to better perception towards overall aspects of CF in the study areas. The reason why the farmers in Malt Barley contract arrangement were probably due to their educational background, farming experience and the income they obtained from the scheme as compared to the subsistence farming they engaged in before their participation in contact scheme.

¹⁶ “GP”=“Participants farmers at Germama ”; “GNP”=“Non participants farmers at Germama”;; “PK”=“Participants at Kuriftu Hida”; “NPK”=Non-participants at Kuriftu Hida”; “AP”=Participants at Adulala Hake” and “ANP”=“Non-participant farmers at Adulala Hake”

Table 5 Overall perception of smallholder farmers in the PAs (n=368)

S.N	Levels of perception	Criteria	Respondent smallholder Farmers				Mean	SD
			Germama		Kuriftu Hida and Adulala Hake			
			No	%	No	%		
1	Poor	Upto 86.95	27	19.9	189	81.5	182.91 43.98	
2	Average	>86.96-100	63	46.2	43	18.5		
3	Better	>100	46	33.9	-	-		

Source: Survey Result 2018 categorized based on Tanweer, et al., 2018

However, the majority of the respondents in Sugarcane contract farming arrangement at Kuriftu Hida and Adulala Hake were found below the average perception category and belongs to poor perception category as compared to those respondents at Malt Barley contract arrangement. From the above explanation, one could understand that farmers' involvement in Sugarcane contract arrangement was largely by force (i.e. without the willingness of farmers) and the government incorporated them into Wonji Shewa Sugarcane outgrower schemes. This was because of the proximity of SHFs farmland to irrigation scheme near Awash River and factory farms. Thus, the farmers were obliged to take part in the outgrower scheme. In the qualitative analysis of this study, the KIIs and the FGDs conducted with Kuriftu Hida and Adulala Hake discussants explained that it was mandatory for SHFs to participate in Sugarcane outgrower scheme or leave their farmland for the factory and SHFs were compelled to choose the first option (i.e. to participate in the outgrower scheme). Unless and otherwise, they had to leave their farmland and there was no exit strategies designed for farmers. Furthermore, the perception patterns obtained from farmers' with contract and without contract at Germama were similar and hence the aggregate results were considered in the perception analysis. Similarly, this was also common for farmers with and without contract at Kuriftu Hida and Adulala Hake (i.e. Sugarcane outgrowers), their perception on the six themes were similar regardless of their participation.

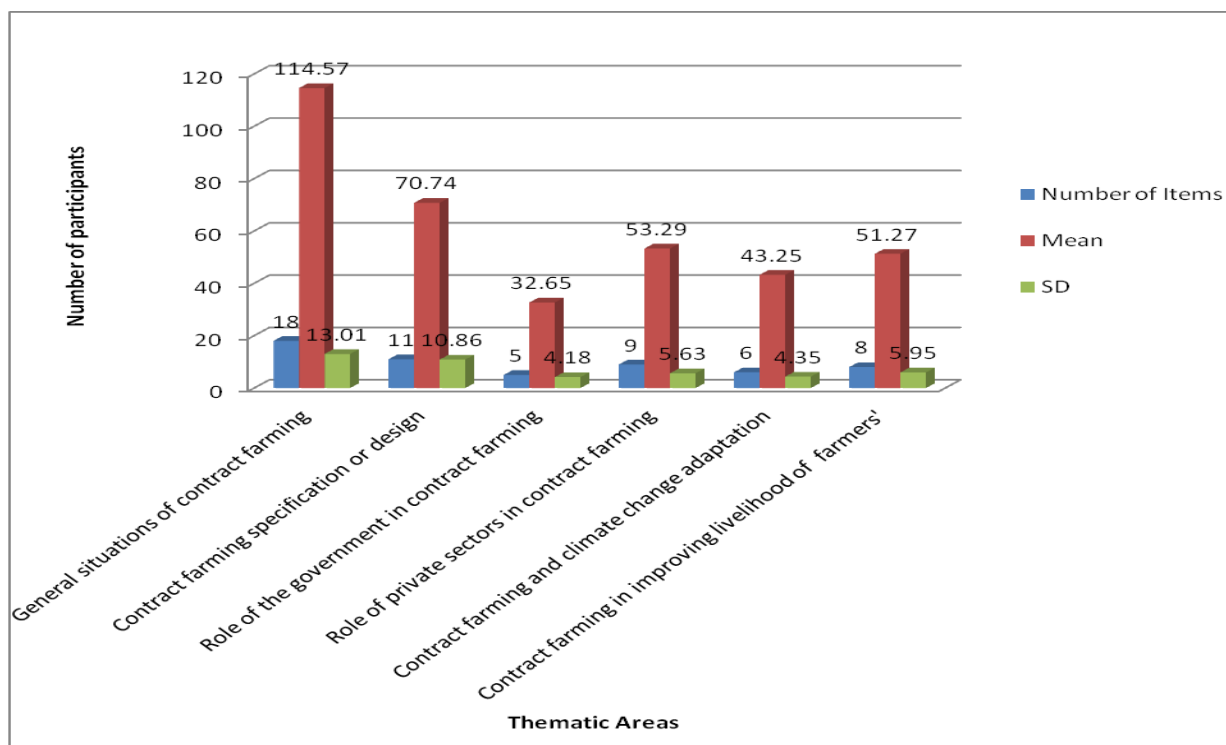


Figure 5 A graph of perceptions of farmers' on thematic areas

Source: Survey Result, 2018

Perception on general situations of Contract farming

To understand the importance of CF and its details, it is essential to examine first the perceptions of farmers' on CF. Second; this requires comprehending the benefits CF provides to poor farmers and its contribution to their current livelihood as compared to their livelihood before. The detailed analysis of the perception of farmers' on CF schemes geared toward the understanding six themes in this study. These themes include (i) overall aspects of CF, (ii) CF design, (iii) the role government in CF, (iv) the role of private sectors or development partners in CF, (v) the link between CF and climate change, and (vi) CF role in improving the livelihoods of farmers' and food security situations of farmers' in the study areas. Accordingly, as indicated in Table 5, the mean score were the highest (i.e. 114.57) for all the respondents at Germama, Kuriftu Hida and Adulala Hake under the general situation of CF.

It was reported that the thematic areas such as CF design, role of private sector in CF, CF in improving livelihoods and ensuring of food security of smallholder farmers, CF and climate change adaptation, and the role of the government in CF scored mean of 70.74, 53.29, 51.27, 43.27 and 32.65 respectively, in descending order on perception of farmers'. In relation to the themes, the mean scores were similar for the farmers' of the three-peasant association irrespective to their crop type (Malt Barley and Sugarcane) and their locations. Furthermore, the perception patterns obtained from farmers' with contract and without contract at Germama were similar and hence the aggregate results were considered in the perception analysis. Similarly, this was also common for farmers' with and without contract at Kuriftu Hida and that of Adulala Hake (i.e. Sugarcane outgrowers), their perception on the six themes were similar regardless of their participation.

Table 6 Item based perception of smallholder farmers at Germama Peasant association

S.N	Description of Items	Peasant Association			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean Score	Rank of Score	Mean Score	Rank of Score
I	Overall Contract farming situations				
1	It improves agricultural practices	3.73	11	2.34	10
2	It increases labour efficiency	4.50	2	2.30	11
3	It improves family labour utilization.	4.01	6	1.80	17
4	It creates market linkages and market outlets.	4.67	1	2.69	5
5	It increases household income.	4.13	4	2.26	13
6	It reduces poverty and improves food security of households.	4.48	3	1.90	15
7	It creates employment opportunities.	3.92	10	1.74	18
8	It Improves overall livelihoods of a family.	4.06	5	1.90	16
9	It increases use of agricultural inputs and enhances production.	3.95	8	2.28	12
10	It reduces the production of other crops other than contract farming crops.	2.92	18	3.26	1
11	It increases smallholder farmers' know-how and improves climate adaptation.	3.61	15	2.84	2
12	It improves agricultural practices and use of agro-chemicals.	3.71	13	2.75	3
13	Increases the participation of female-headed households and keeps the rights of Women.	3.74	12	2.05	14
14	It increases the user rights of smallholder farmers (land, water etc).	3.98	8	2.45	9
15	It improves the way agro-processing firms' plans, performs and monitors its activities.	3.45	16	2.67	6
16	It improves irrigation water use and other water sources.	3.49	17	2.58	8
17	The price is set by the Agro-processing firms	4.01	6	2.74	4
18	The agro-processing firms, cooperatives and representatives set the price from smallholder farmers.	3.65	14	2.59	7

Source: Field Survey, 2018

In this section, as portrayed in the item based perception analyses of Table 6, there were five top perceived items that ranked 1-5 summarized as follows. Regarding farmers' at Germama, the items perceived were (i) CF creates market linkages and market outlets (1st rank with mean score of 4.67 followed by (ii) CF increases labour efficiency (2nd rank with mean score of 4.50). (iii) CF reduces poverty and improves food security of households (3rd rank with mean score of 4.48), (iv) it increases household income (4th rank with mean score of 4.13) and (v) CF improves the overall livelihood of a family (5th rank with mean score 4.06). Therefore, based on their perception of items the top selected items was that CF reduces the production of other crops other than Sugarcane (1st rank with mean score of 3.26) followed by CF increases farmers' know-how and improves climate change adaptations (2nd rank with mean score of 2.84). Moreover, CF improves agricultural practice and use of agro-chemicals such as weed killer,

pesticides and fertilizers, the price was set by the agro-processing firm and CF creates market linkages and market outlets with rank and mean score of 3rd rank (2.75), 4th rank (2.74) and 5th rank (2.69), respectively.

In summary, the perception analysis on items at Kuriftu Hida and Adulala Hake were quite different from the perception pattern of farmers' observed at Germama. From this, one can find out that the farmers' engaged in Malt Barley and Sugarcane CF perceived different items differently based on their farm experience, input provision and location.

Perception of farmers on contract design

Contract farming specification or design is one of the important requirements in CF arrangement (Ayelech, 2010). Eaton and Shepherd (2001) pointed out that the successful implementation of CF depends on the understandings of the farmers' engaged in such schemes. They continued explaining that the way agreements written, the provision of inputs, the pricing and market situations, the roles and responsibilities of each parties participating in CF determines the perception of farmers', which in turn affects the decision to participate or not to participate.

Table 7 Item based perception on contract specification					
S.N	Description of Items	Peasant Associations			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean Score	Rank of Scores	Mean Score	Rank of Scores
II	Contract farming specifications or Design				
1	The agreements or specification only keeps the interests of agro-processing firms	3.79	9	1.91	9
2	The agreement only keeps the interests of smallholder farmers.	3.23	10	2.59	8
3	It protects the interest of both parties (i.e. Agro-processing firms and smallholder farmers).	3.10	11	1.88	11
4	It includes all important items and written in clear languages.	3.99	7	1.97	10
5	Contract farming design governs the whole process in the schemes.	3.92	8	3.19	6
6	It includes the roles of agro-processing firms, smallholder farmers and cooperatives.	4.29	5	3.18	5
7	It facilitates trainings on extension packages and timely supply of production and use of agronomic practices	4.46	3	3.70	2
8	Contract farming helps in risk sharing and solves market Problems.	4.51	2	4.33	1
9	There are strong supervision systems in place.	4.24	6	3.27	4
10	There are good working environment and relationships in place.	4.33	4	3.19	6
11	There are conflict resolution mechanisms included in the design	4.63	1	3.54	3

Source: Own Survey, 2018

Data collected on the perception of smallholders on contract farming specification at Germama (i.e. Malt Barley) revealed five best items. Their perception pattern in descending order of conflict resolution mechanisms (i.e. best among all), risk sharing, solving market problems with rank and respective mean scores (i.e. 1st 4.63, 2nd 4.51). CF facilitates trainings on extension packages and timely supply of production inputs and use of agronomic practices followed by CF that created good working environment and put relationships in place with their rank and mean scores of (3rd (4.46), 4th (4.33), and 5th (4.29), respectively.

Similarly, at Kuriftu Hida and Adulala Hake (i.e. Sugarcane outgrowers) exhibited almost similar pattern in perceiving the items pertaining to CF specifications or design. Hence, the perception of farmers' on contract specification or design reported a rank and mean score of 1st (4.33) and 2nd (3.70) for replying that CF helps in risk sharing and solves market problems, CF facilitates trainings on extension packages and timely supply of production and use of agronomic practices, respectively. Furthermore, the 3rd (3.54), 4th (3.27) and 5th (3.18), CF has a conflict resolution mechanisms that is included in the design, strong supervision systems in place and the roles of agro-processing firms, farmers' and cooperatives. In both cases, one can conclude that the farmers' perceived the inclusion of CF specification in the contract arrangement in similar ways. The mean scores of the five best-selected items indicated similar perception patterns emanated from understanding of how important the contract specifications that could make differences.

Perceptions of farmers' on the role of the Government

The role of the government plays a pivotal role for the success and failure of CF arrangement in commercial agriculture (Prowse, 2012). Here the government plays a significant role in raising the awareness of farmers' on CF and provide the necessary support through development agents and agricultural experts apart from designing policies, guidelines, laws and legal frameworks that guides the overall implementation of CF practices. According to (Eaton & Shepherd, 2001; Simmons, 2005 & Simmons, 2002) the government plays two significant roles in improving the drawbacks of CF. First, it may regulate the market situations in designing contract policies, strategies, rules and regulations that geared towards CF and the government may sanction contractors not to abuse market. Second, the government facilitates conditions for contractors or agri-business firms to initiate new contracts and provide farmers' support, train them and make them suitable for contract selection.

Table 8 Farmers' perception on the role of Government in contract farming					
S.N	Description of Items	Peasant Associations			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean	Rank of Score	Mean	Rank of Score
III	The role of the government in Contract farming Systems				
1	They play a significant role in resolving conflicts that arises between agro-processing firms and cooperatives representing SHFs.	4.60	1	3.34	1
2	There is clear and precise contract farming policies, legal framework and laws that guides all contract farming processes.	4.13	2	3.15	2
3	The contract farming policy, legal frameworks and laws are strategically in application.	3.60	4	3.03	3
4	Marketing guidelines on contract farming were designed and implemented in a way it supports all parties engaged in contract farming.	3.49	5	1.83	4
5	There are strong involvement of cooperative unions and basic cooperatives for the successful implementation contract farming schemes in the study areas.	3.70	3	1.78	5

Source: Computed from Field Survey, 2018

The perception studies portrayed in Table 6 revealed that all of the item responses in the mean scores and their respective ranks almost follow similar trends for all the peasant associations included in the study. The data describes that for the study areas (i.e. Germama, Kuriftu Hida and Adulala Hake) the first and second top mean scores belongs that the government plays a significant role in resolving conflicts that arises between agro-processing firms and cooperatives representing farmers' with rank of 1 and 2 with mean score of 4.60 and 3.34, respectively. The last two items, namely marketing guidelines on CF could be designed and implemented in a way that it supports all parties engaged in CF and there are strong involvement of cooperative unions and basic cooperatives for successful implementation of CF schemes in the study areas with rank 5 (3.49) and 5(1.78), respectively. From the list of items indicated in the table above, agricultural policies designed and implemented in Ethiopia (Agricultural Development Led Industrialization (ADLI), PASDEP, Growth and Transformation Plan (GTP) 1 and GTP2) with limited scope on agricultural commercialization, there were no specific strategies, rules, regulations and legal frameworks designed to guide and address CF in Ethiopia in general and Oromia Regional State (MoFED, 2015 & MoFED, 2006).

Table 9 Farmers' perception on the role of private sectors in contract farming					
S.N	Description of Items	Peasant Associations			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean	Rank of Score	Mean	Rank of Score
IV.	Role of private sectors or development partners in contract farming schemes				
1	Development partners involve in contract farming in providing trainings.	4.01	8	2.84	2
2	There are good technical supports in place.	4.29	6	1.66	8
3	There are provisions of agricultural input supply in time, in the required amount and in the right quality.	4.49	4	1.84	7
4	There are inspections on quality of agricultural products.	4.66	2	2.87	1
5	There are introduction of new varieties of seeds to smallholder farmers.	4.54	3	2.52	3
6	Contract farming had introduced new technologies and facilitated its adoption in their areas.	4.71	1	1.96	6
7	There are good provision of credits and financial Services in contract farming.	4.31	5	2.20	5
8	There are good logistics and transportation services in place.	4.12	7	2.25	4

Source: Computed from survey result, 2018

Perception on the Role of Private sectors or Development Partners

In realizing the successful implementations of CF, private sectors and/or development partners plays a prominent role. One of the key role that the private sector and/or development partners supports CF practice building the capacities of farmers', cooperative unions, basic cooperatives and experts working in the field of CF (Nham, 2012). Thus, it is very crucial to investigate the perception of farmers' on the role of private sectors or development partners in the study areas (See table 10 below).

Regarding the perception of farmers' on the role of private sector or development partners on CF, described and ranked based on their mean score. Consequently, the Germama smallholder farmers' reported that: (i) contract farming had introduced new technologies and facilitates its adoption in their areas (1st rank with mean score of 4.71) and inspections were in place on the quality of agricultural products (2nd, 4.66). Contract farming introduced new varieties of seeds to smallholder farmers' (3rd, 4.54) and it facilitated the provision of agricultural input supply in time, in required amount and in the right quality (4th, 4.49) followed by provisions of credits and financial services (5th, 4.31).

The smallholders at Kuriftu Hida and Adulala Hake reported the perceived role of private sectors and or development collaborators as shown below. To this end, the top five items in CF where inspections on quality of agricultural products was the first (1st, 2.87) followed by development partners involve in CF in providing trainings for farmers', cooperatives, agricultural experts and development agents (2nd rank with mean score of 2.84). It was also reported that CF introduces new varieties of seeds to farmers' (3rd, 2.52), CF provides good logistics and

transportation service (4th, 2.25) followed by those reported that it provides credits and financial services for farmers' (5th, 2.20). From the overall reports, one can find out that the perception of farmers' on the role of private sectors among the study peasant associations differs in their rank and mean scores exhibiting different perception patterns, that emanated from their understanding on the role of private sectors and/or development partners.

The role of contract farming in climate change adaptation

CF as a business arrangement and a tool for agricultural transformation has opportunities in increasing the income and has the capacity to improve the livelihoods of farmers' by increasing crop productivity, maximizing economic efficiencies, searching market outlets (Agarwal, 2008; ATA, 2012; Dhillon and Singh, 2006; Eakin, 2005 & 2003; Eaton & Shepherd, 2001;). Moreover, CF allows transfer of new technologies and facilitates its adoption such as introduction of new varieties of seeds and other modern inputs to improve farmers' agricultural practices. It is, therefore on this ground that the systematic agricultural transformation through CF by creating a conducive ground for addressing climate change related challenges (ATA, 2012 and CRGE, 2011).

Table 10 Perception on the role of contract farming in climate change adaptations					
S.N	Description of Items	Peasant Associations			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean	Rank of Score	Mean	Rank of Score
V	The role of contract farming in facilitating climate change adaptations				
1	Resources for contract farming serves as inputs for climate change adaptations.	4.57	3	2.44	6
2	Contract farming facilitates climate change adaptations.	4.65	1	2.61	5
3	Participant families in contract farming schemes could better adapt to climate change.	4.59	2	2.65	4
4	Contract farming reduces risks emanated because of climate change.	4.52	4	2.99	1
5	Contract farming could raise additional income that subsidizes other crop production.	4.50	5	2.84	2
6	Contract farming reduces drought and reduces the effects of erratic rainfall through irrigation and use of other water sources.	4.10	6	2.83	3

Source: Field Survey, 2018

As reported in Table 10, the farmers' perception on the role of CF in facilitating climate change replied in terms of the responses of the farmers'. Thus, the farmers' at Germama (Malt Barley) perceived that CF facilitates climate change adaptation (1st rank with mean score of 4.65) followed by participant families in CF schemes could better adapt to climate change (2nd, 4.59). Besides, in the (3rd, 4.57) and 4th (4.52), smallholders perceived that resources for CF serves as inputs for climate change adaptations and contract farming reduces risks emanated because of climate change, respectively. Finally, in the (5th, 4.50), smallholders perceived that CF raise additional income that subsidizes other crop production.

Conversely, the farmers' at Kuriftu Hida and Adulala Hake responded to the items based on their existing CF situation. To this end, they reported that CF reduces risks emanated because of climate change and it could raise additional income that subsidizes other crop production with (1st, 2.99) and 2nd, 2.84), respectively. In the (3rd, 2.83), (4th, 2.65) and (5th, 2.61) farmers' perceived that CF reduces drought and reduces the effects of erratic rainfall through irrigation and use of other water sources, participant families in CF schemes could better adapt to climate change and CF facilitates climate change adaptations, respectively. In conclusion, one can find out that when one observes the mean scores and their respective ranks, 1-3 ranks for Germama were in items 2, 3, 1, respectively and vice versa for Kuriftu and Adulala. This clearly pointed out that the situation of drought; erratic nature of rainfall and risks emanated from climate change has given priority among farmers' at Kuriftu Hida and Adulala Hake.

Perception on contract farming as a livelihood improvement strategy and ensuring food security

As evidenced in (Bijman, 2008; Eaton & Shepherded, 2001; Minot, 2011; Prowse, 2012; USAID, 2012) CF arrangement requires access to factors of production such as land, capital, labour technical assistance, technologies and time, which are the cornerstones and basic inputs for the agribusiness firm and the farmers' over all livelihoods. CF increases incomes of farmers' by improving labour efficiency, increasing productivity, which ultimately improves the livelihoods of farmers in the schemes (FAO, 2001; Fan, et al., 2007; Kirsten & Sartorius, 2010; Kirsten & Sartorius, 2002; Priscilla, et al., 2012).

Table 11 Perception on the role of contract farming in improving livelihoods of farmers					
S.N	Description of Items	Peasant Associations			
		Germama		Kuriftu Hida and Adulala Hake	
		Mean	Rank of Score	Mean	Rank of Score
VI	The role of contract farming in improving livelihoods and ensuring food security of farmers				
1	Contract farming enhances livelihoods of smallholder farmers by reducing cost of agricultural production.	3.65	7	2.33	3
2	It reduces unnecessary delay in inputs supply and resource delivery.	3.77	6	2.46	1
3	It creates good cooperation among participant smallholder farmers in contract farming.	4.13	5	1.90	7
4	Contract farming creates a favorable condition for capacity buildings.	4.36	3	2.19	4
5	It creates good working relation with development agents, improves livelihood through improving agricultural activities, increase income and meeting food security.	4.58	1	2.42	2
6	Contract farming raises smallholder farmers' awareness on modern agricultural production.	4.54	2	2.13	5
7	It increases production and productivity through strengthening family relationships or bondages.	4.21	4	2.00	6

Source: Household Survey, 2018

At Germama (Malt Barley) the report of the farmers on perception of the role of CF in improving livelihoods of farmers' clearly pointed out that CF creates good working relation with development agents, improves livelihood through improving agricultural activities, increase income and meeting food security (i.e. 1st, 4.58). In the second and third rank, CF raises farmers' awareness on modern agricultural production (2nd, 4.54) followed by CF creates a favorable condition for capacity buildings (3rd, 4.36). The farmers' reported that in the 4th rank (4.21) and 5thrank (4.13), CF increases production and productivity through strengthening family relationships or bondages and creates good cooperation among participant farmers' in CF (i.e. inter and intra household relations manifested through "Debo", "Wenfel" and "Jigi", respectively).

Concerning the study of perceptions of farmers' at Kuriftu Hida and Adulala Hake, the study report indicated that CF reduces unnecessary delay in inputs supply and resource delivery(1st, 2.46) followed by CF increases production and productivity through strengthening family relationships or bondages and creates good cooperation among participant farmers' (2nd, 2.42). Moreover, it was reported that CF enhances livelihoods of farmers' by reducing cost of agricultural production (3rd, 2.33) and then creates a favorable condition for capacity buildings (4th, 2.19) followed by CF raises farmers' awareness on modern agricultural production (5th, 2.13).

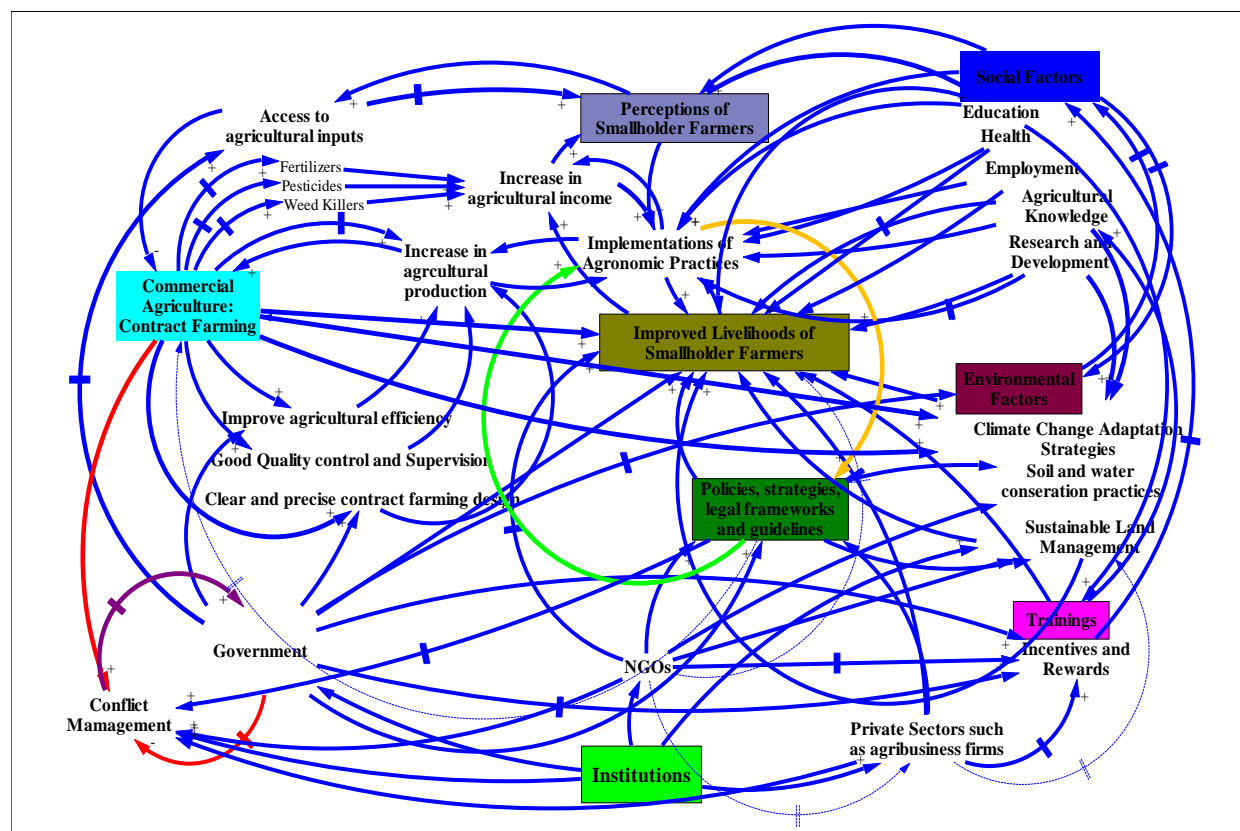


Figure 6 System Dynamic diagram explaining the interaction and integration between factors related to Perceptions of farmers on contract farming, climate change adaptation and livelihoods

Source: Own Construction, 2018

Based on the field data, we tried to depict the interactions of various institutions that may affect the perceptions of SHFs on CF schemes and climate change adaptation actors in a system environment. As revealed in figure 6, the

system approach in studying perceptions of farmers engaged in Malt Barley and Sugarcane contract farming were conducted in Kofale districts and Adama district of Oromia National Regional State. The (+) sign denotes the positive relationship between elements in the system. This is because, the perceptions of SHFs, government and NGOs on the relationships among various factors as shown in figure 6 immensely affect the sustainability of agricultural commercialization process operating at different scales. This means that the better the perceptions of various actors, the better the sustainability of agricultural practices, agricultural production and the existence of sustainable market in a particular location. The (-) sign shows the negative relationships that existed among the factors in the system. In addition, the broken line depicts loose relationships between different factors that contribute towards perceptions of farmers. The green, red, purple and orange show the loop that back and forth system linkages that existed among the factors in the system. The arrows with the parallel line at the middle depicts the delay occurred in the integration and relationship among the factors or the institutions in the system. Because of the delay between the systems, for instance delay in agricultural inputs ultimately hinders the entire contract farming schemes and CCASs.

Moreover, the interaction between the main system and the subsystem portrayed that there are complex relationships between them, whereby particular systems affects the other systems positively and the other one negatively in the overall perception studies. From the figure for instance, there are loose integration between policies, strategies, legal frameworks, guidelines and contract farming. These clearly suggested that the systematic integration of policies, strategies, legal frameworks, guidelines for successful implementations of contract farming and conflict management plays a pivotal role improving perceptions of farmers that ultimately have a bearing on livelihoods of farmers. Understanding all the interplay among the factors better reduces the potential conflict between the stakeholders (interested and supportive) those engaged CF, since the continuous discussion between them help to build a solid ground that lay a foundation for solving problems whenever it arises. The better the perception of farmers on th links between the overall system, the better the farmers integrate the factors explained in the figure and employ CF as a response to climate change adaptation and improve their livelihood. Furthermore, the state and non-state actors that collectively known as stakeholders could also reap benefits out of integrating all these factors for better CF implementation and address climate change induced effects such as drought, flood and other climate change related impacts. Above all, the systematic link among institutions: the government, private sectors and the NGOs played a significant role in realizing the success of contract farming arrangement and its integration with CCASs that aimed to enhance perceptions of farmers through trainings, awareness raising, technical assistance and creating access to agricultural inputs, financial services and improves overall sustainability situations of agricultural commercialization.

CONCLUSIONS AND RECOMMENDATIONS

This paper focuses on analyzing the farmers' perception on CF as a response to climate change adaptations by taking into account Malt Barley CF at Germama, Kofale district of West Arsi Zone of Oromia Regional State. Moreover, it also studied two Sugarcane outgrower schemes at Wonji Shewa sugar factory with special attention on Kuriftu Hida and Adulala Hake PAs. The overall understanding of the whole CF processes, sustainability of commercial agriculture including the impacts of CF on livelihoods of farmers, contract design, and benefits obtained out of CF, the roles and responsibilities of the government, private sectors including the agribusiness themselves. The respondents including the non-participant farmers with mean score 1114.57 and standard deviation of 13.1 reported that they have better perception on general situations of CF and this clearly shown that the perception of farmers' on other categories were limited and one can conclude that their perception on the other segments were very low as compared to first one. Therefore, it is very essential to understand the details of contract situations, where farmers engaged in Malt Barley CF have perceived CF as it was very essential in improving their income and food security of farmers' and ensure sustainability in agriculture, which in turn contributing to their sustainable livelihoods and climate change adaptations in the study areas. The farmers engaged in Malt Barley CF have better understanding on the CF as compared to those farmers' engaged in sugarcane CF arrangements. This was because of the following critical conditions for farmers' to engage in CF schemes.

1. The farmers have perceived that input provisions such as improved variety of seeds, fertilizers, agrochemicals, technical assistance by extension workers, technology transfers, full packages of agronomic practices are better in CF arrangements and hence these improves agricultural activities on sustainable basis, which in turn improves livelihoods of farmers continuously in the study areas;
2. As a result of use of full agricultural packages, the income obtained from Malt Barley CF was far better than the income obtained from other crops (Wheat, Oats, Pea etc) outside CF. Thus, at Germama the non-participant farmers have perceived CF situations in similar way as that of participant ones;
3. Both participant and non-participant famers' perceived that there are better access to market, good pricing mechanisms and incentives for Malt Barley with better standards or grades. Besides, the participants have better access to credits, extension services, markets and this why the participants and non-participants are interested in CF arrangements; and
4. They consider CF as a profitable business model whereby their income is increasing from time to time and these is immensely helping sustainable commercial agriculture.

Most of the respondents belong to productive age group (i.e. 31-64 years) and this clearly indicated that those active, abled and energetic productive farmers were interested to engage in CF arrangement.

Despite these perceived importance and advantages of CF as a response to CCASs to farmers, there are problems of delay in payments and collection of their produces. This situation has created side selling (hunting for spot markets) by some of the contracted farmers and also affected the sustenance of commercial agriculture like in CF. This was further affecting the relationship between the cooperative unions and the agribusiness firms including Assela Malt

Factory. Moreover, most of the respondents engaged in Malt Barley at Kofale (Germama) were successful in terms of earning income and other benefits they obtained from CF as compared to those farmers' engaged in Sugarcane outgrower at Wonji Shewa: Kuriftu Hida and Adulala Hake. The income earning was higher for participant respondent households engaged in CF of Malt Barley (i.e. the participants earn more a mean income of 31082.94 Ethiopian Birr (ETB) per year as compared to those participant respondent households in sugarcane with mean income of 21784.70 ETB per year. Unfortunately, participant and non-participant farmers at Kuriftu Hida and Adulala Hake perceived and considered CF as if it was not a profitable and successful business model. This was because:

1. Almost all of the respondents in Sugarcane outgrower perceived that the participation was not based on the interest of farmers', rather they were compelled either to leave their farmland to the factory or organize themselves into basic cooperatives and engage in Sugarcane outgrower and use their family labour and sell their produce to the factory through cooperative union. Hence, this is playing a pivotal role in improving agricultural sustainability in their areas.
2. The farmers' perceived that the pricing situation was not enough and the income earned from Sugarcane was limited to 60 ETB Birr per Quintal and exacerbates the existing food insecurity situations. Moreover, despite the use of agricultural inputs and agronomic practices, the production of the Sugarcane lasts from twelve up to fourteen months and its production decreased from time to time affecting the income obtained from it;
3. Both the participant and non-participant farmers' perceived that the Sugarcane CF scheme as a business model was not profitable and they are interested to end their agreement interested to stop planting Sugarcane. They are rather very fond of covering their farmland with other crops if the factory allows them peacefully and they are interested to engage in other crops such as Teff, Maize and Chickpeas, onions and obtain better income.

Therefore, it is paramount important not only to reconsider the contract agreement, but also it is essential to work on contract specifications to continue in CF schemes as a response to CCASs in the study areas. Moreover, strengthening the role of the government and private sectors in CF, climate change adaptations and CF in improving the livelihood and ensuring food security of farmers and improve the pricing situations of the respective agricultural produce (i.e. Malt Barley and Sugarcane). Furthermore, working to improve the perceptions on farmers' on CF arrangement as a business model is very essential and increasing the price of agricultural produce and keeping benefits earned from CF may serve as a spillover effect for other crops other than crops in CF schemes, which ultimately improves sustainability in agricultural commercialization. Thus, it is recommended that equipping farmers with necessary knowledge and skills through trainings (i.e. basics of agricultural sustainability: Standards or grades of agricultural produce, extension services, proper input and agrochemical application, agronomic practices etc), provision of technical assistance on continuous basis, technology transfer and work to raise income of farmers'. It is also very essential to strengthen or capacitate the extension workers that supervise and evaluate the impacts of CF on the livelihoods of farmers in the study areas.

AUTHORS' CONTRIBUTIONS

Megersa Getachew and Assefa Engdawork generated the idea and designed the study. Megersa carried out data collection, data analysis, and write-up. Assefa played a supervisory role, read and revisited the manuscript. Both authors read and approved the manuscript.

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ABOUT THE AUTHORS:

Getachew Megersa Bekele, Ph.D Candidate at Center for Environment and Development Studies, College of Development Studies, Addis Ababa University

Engdawork Assefa (Ph.D)and Associate Professor at Center for Environment and Development Studies, College Of Development Studies, Addis Ababa University