FACTORS INFLUENCING PERFORMANCE OF CONTRACT FARMING IN KENYA: A CASE OF SORGHUM SMALLHOLDER FARMERS IN IMENTI NORTH, MERU COUNTY, KENYA

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ABSTRACT

The purpose of this study was to determine the factors that influence the performance of contract farming among sorghum small holder farmers in Imenti North, Meru County, Kenya. The statement of the problem enumerated from the poor performance sorghum contract farming programmes are facing yet the contract farming arrangement is believed to provide numerous benefits to the farmers such as market opportunities, credit accessibility and capacity building among others. The objective of the proposal was to determine the influence of interlinked services on performance of contract farming, the influence of income on performance of contract farming, the influence of sociological factors on performance of contract farming, and the influence of nature of the contract on performance of contract farming. A descriptive research design was used. The target population was obtained from sorghum contracted small holder farmers in Imenti North, Meru County. The target population for investigation was drawn from 1200 contracted small holder farmers from four locations in Imenti North. The sample size was 291 to whom semi structured questionnaires was administered for data collection. The simple proportionate random sampling method was used to determine the sample size. The reliability of the instruments was assessed using the half-split technique. The data was analysed using both qualitative and quantitative methods. A correlation analysis was done to determine the relationship between variables and a multiple regression analysis was conducted to determine the relationship between the dependent and independent variable. The findings were presented in tables. The results obtained in this study were utilized in designing and implementing successful programmes in the sorghum contract market. The study found that farmers received benefits from participating in contract farming where trainings were received most, and then input supply arrangements, input loan while crop insurance cover was the least received. Further, it was found that in terms of the most beneficial services, the ranking was as follows; trainings, insurance cover, input loan and the least beneficial being inputs arrangement. The study also found that the farmer's annual average income increased after joining contract farming and this was linked to high yields and high prices offered by contract markets. The study found that sociological factors have a strong and positive influence on the performance of contract farming. The study found out that most of the farmers that participated in contract farming were aged between 30-40 years and had attained primary education. Further, the study found that it was strongly agreed that the age of a farmer influences performance of contract farming and education level of a farmer influences performance of contract farming. It was agreed that the gender of a farmer influences performance of contract farming while it was undecided that the land size of a farmer influences performance of contract farming. The study found that most of the farmers preferred written contracts compared to oral ones. The study found out that farmer's satisfaction and experience influence their attitude towards contract farming. The study concluded that income had the greatest influence on performance of contract farming among sorghum

smallholder farmers in Imenti North in Kenya followed by nature of contracts, then interlinked services and sociological factors had the least effect on the performance of contract farming among sorghum smallholder farmers in Imenti North in Kenya. The study recommended that the government should contribute towards more farmer trainings through the Ministry of Agriculture Officers, involve research institutions to come up with new & high yielding sorghum varieties, assist the farmers by minimising the price of the essential farm input equipment's as well as providing tractors for hire to be accessible to farmers at a cheaper rate. The study also recommended that farmers should be loyal to their contract markets and not side sell to brokers and ensure that the products are of the required standards to make sure that the consumers who are also the buyers are satisfied. Lastly, the contract firms should strive to sign more written contracts with the farmers which they prefer. The study further recommends that since the study was only limited to Imenti North in Meru County, a similar study should be done in other counties in Kenya and for other crop farmers such as Maize or dairy farmers.

Key Words: *performance, contract farming, sorghum smallholder farmers, Imenti North, Meru County, Kenya*

NTRODUCTION

Sorghum grain is the 5th most significant cereal crop cultivated globally. The grain species originated in Australia, Mesoamerica, Africa, Indian Ocean and parts of the Pacific Ocean. Sorghum serves as a cash crop and also consumed domestically. There are a range of uses that sorghum carries which include human food, biofuel, animal feed, production of flour and alcoholic beverages. Nutritionists classify sorghum as an extremely healthy cereal which is rich in vital nutrients that are very important in the body. Owing to its nutritional and rising commercial value, several countries around the globe promote production of the crop.

Statistics from the Food and Agriculture Organization of the United Nations have ranked the USA as the top most producer of sorghum with an average production of 11.5 million tonnes. India comes second; with the ideal climate in the country the farmers do not use any supplementary mechanisms to hasten the growth of the crop. Nigeria ranks third globally and the top in Africa. Other countries in the top ten list of sorghum production globally are; Mexico, sudan, Sudan former, China, Argentina, Ethiopia and Australia (Chelengat, 2017).

Sorghum is majorly grown in the arid and semiarid lands (ASALs) of Africa and Asia, probably owing to its diversity and versatility. The future of the sorghum value chain is linked to food security, poverty alleviation and income growth. The objectives of the sorghum enterprise are more applicable in developing countries of the African continent as compared to the developed countries.

Widely held smallholder farmers (SHFs) in the Sub-Saharan Africa (SSA) live below the poverty line and they depend on agriculture as their main source of livelihood (Chen and Martin , 2010). The major contributing factors towards poverty have been low production and limited market opportunities for their harvest which results to majority of

the farmers failing to purchase quality inputs contributed by absence of credit accessibility. According to (Tschirley et al., 2009), initiatives to reverse the trend have been established; the private sector and the government have joined hands in introducing the concept of contract farming especially with smallholder farmers. This is to counteract these circumstances and provide an alternative solution by providing inputs on credit and an assured market for their produce.

In developing countries, CF has enabled farmers to commercialize their operations through markets that have been created domestically and internationally. Numerous case studies that have been undertaken involving agricultural commodities in Africa, Central and Latin America and Asia show that farmers have benefited variably from CF through access of markets, production inputs and other non-material benefits (Masakure, 2011).

Contract farming has been practiced in the SSA countries for several crops and for a long time. For instance, Zimbabwe, Zambia, Malawi and Mozambique are widely known for production of cotton under CF. However, there are no reliable figures indicating the number of farmers participating in CF in developing countries. The informal estimates show that in Kenya for example, only a quarter of the farmers produce under contract. The rates in other countries are lower. Surveys in Ghana, Vietnam and Uganda indicate that less than 5% of the small holder farmers participate in CF. The World Bank conducted a study that depicted only 7 percent of the sampled households engaged in any form of agricultural CF (Losch, Freguin and E.White, 2011)

In Kenya, sorghum is grown mostly in the ASALs of the country. Sorghum has been a deserted crop over time and serving the subsistence purposes only. The cereal crop lost favour when most farmers shifted to maize which became the staple food and most preferred crop upon introduction by the colonizers. However, owing to the effects of climate change, Kenya has been experiencing declining rainfall amounts. As a result, Kenya has become a food deficit country due to decreased food production. This has necessitated the Kenyan government to establish programmes such as contract farming that promote growth of drought tolerant crops such as sorghum, which is known to adapt well in harsh environments as a means of improving income and ensuring food security.

Contract Farming is an arrangement involving two or more parties who come into an agreement, whereby one party is the producer and the other the buyer (setboonsarng et al., 2011). According to Bellemare, CF is a scheme of promoting smallholder involvement in rationalized market opportunities, thereby boosting and securing SHFs returns. Through CF the proceeds of SHFs are extensively grown (miyata et al., 2009; Olomola, 2010; Bellemare, 2012; Wainana et al., 2012).

The main goal of CF is to create a ready market to the farmers, provide agricultural extension services and inputs (Birthal, 2010). On the other hand, the SHFs, should commit to produce the contracted crop according to the specifications given by the purchasers in terms of quality, quantity and standards. With the above-mentioned services to be provided by the contractor, contract farming is expected to reduce poverty,

hunger and catalyse economic development (Parekh, 2013). According to Oya, 2012, contract farming accounts for approximately 15% of agricultural output in developed countries. However, the potential benefits vary with the nature of contract.

STATEMENT OF THE PROBLEM

The demand for sorghum in Meru is steadily rising due to industrial use such as processing by millers and brewing by East Africa Malting. Sorghum is among the main cash crops in Meru County making the region highly prospective in regards to sorghum growing(GoK, 2013), however the farmers engaged in sorghum contract farming are not able to meet the demand leading to poor performance of CF. Apparently, the demand for sorghum is higher than supply to contract markets. For instance, Shalem Investment Ltd who buys sorghum from SHFs and supplies to East Africa Malting has never achieved the contracted quantity since 2013. This is a clear indication that the performance of contract farming is poor and something needs to be done. In 2013, the company's contracted volume by East Africa Malting was 1,000,000kgs against 600,000kgs which was delivered. 1,460,000kgs contracted in 2014 against 1,110,000kgs delivered, 1,920,000kgs contracted in 2015 against 1,370,000 delivered, 3,860,000kgs contracted in 2016 against 3,100,000kgs delivered, 4,300,000 kgs contracted in 2017 against 4,050,000 kgs delivered and 3.700, 000kgs contracted in 2018 against 3,400,000 kgs delivered. The general manager of East African Malting a subsidiary of East Africa Breweries Ltd quoted "we have a target to provide up to 30,000 tonnes of sorghum in 2017, against the less than 10,000 tonnes that we currently get. This is why the drive to get small holder farmers especially in ASALs is crucial for us" the firm was asking small holder farmers in Meru to sign contracts with their intermediary contractors to grow sorghum (Gwengi, 2016). Since the sorghum contractual market opportunities exist in Meru County, Smallholder farmers should be empowered to utilize them. A well-managed CF arrangement brings efficacy in coordinating and promoting agricultural production and marketing. With organized and well managed CF arrangements, there is reduced risk and uncertainty for the farmers and contractors in comparison to marketing produce in the open market. The performance of contract farming is dependent on numerous physical, Social and economic factors. This could be the reason why contract farming has low performance even with the numerous benefits that come along with the arrangement such as higher prices in comparison to the open markets, provision of inputs and extension services. On the other hand, the benefits inculcated in the CF may not be attractive to the small holder farmers, or the benefits could only be theoretical. Some of the authors have criticised CF and revealed it is not a beneficial arrangement to the SHFs. In this case, the factors that influence performance of CF arrangements remain questionable. Whilst most of the studies explore the impacts of CF on the livelihoods of participating smallholders, only in rare cases are the SHFs themselves asked explicitly about the motivating factors that influence them to produce on contract. This study attempted to bridge the aforementioned literature gap using a case study of smallholder sorghum farmers in Meru County, Imenti North Sub County.

PURPOSE OF THE STUDY

The purpose of the study was to establish the factors that influence performance of contract farming among sorghum small holder farmers.

RESEARCH OBJECTIVES

1. To determine the influence of interlinked services on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County.
2. To determine the influence of income on performance of contract farming among sorghum small holder farmers in Imenti North, Meru County.
3. To determine the influence of sociological factors on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County.
4. To determine the influence of the nature of the contract on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County.

LITERATURE REVIEW

The concept of Performance of Contract Farming among Small Holder Farmers

This study is based on the model of contract farming. CF has been defined differently and especially depending on the context. According to Prowse (2012), CF is when a company lends inputs (fertilizers, seeds, pesticides, credit or trainings) to the crop producers and in return the firm gets all the purchasing power over the contracted crop.CF can also be defined as an agreement between the farmers and the contracting firms to produce and supply particular agricultural products under forward agreements, frequently at predetermined prices (Bellemare and Bloem, 2018)

In normal circumstances the buyer will create a good production environment by facilitating the producer with the expectation of buying the produce during harvest. According to Tschirley et al. (2009), contract farming (CF) can be defined as active vertical coordination between growers of an agricultural product and buyers or processors of that product. In addition, Bellemare and Bloem (2018) defines Contract farming as an agreement between one or more farmer (s) and a contractor for the production and supply of agricultural products under forward agreements, frequently at pre-determined prices.

There are four models of CF which include; centralized model, the multipartite model, informal model and intermediary model. The centralized model also known as classical contract farming involves the processor/buyer purchasing from a large population of SHFs. The model is vertically integrated and, in most cases, this arrangement provides for services like input credit, capacity building and transportation of the harvest. The second model is known as multipartite model arises when a combination of two or more organizations (state, private agribusiness firms, international aid agencies or non-governmental organizations-NGOs) work together to coordinate and manage the

cooperation between buyers and farmers (Oya, 2012). During liberalization, majority of the nation's especially developing ones enthusiastically devoted in CF via joint enterprises with private firms. This model is practiced in China where the joint ventures between the government departments and domestic and foreign investors in establishment of the processing unit as well as entering a contract farming agreement with local farmers (Miyata, 2009). When a joint venture is carefully planned, the vertical coordination may be strong and could offer suitable control in the transactions with farmers.

The third model is the intermediary model which shares most of the features with the centralized model. The only nature being that the organization in the intermediary model represents another firm. The intermediary takes up all arrangements for the buyer including inputs arrangements, trainings, payments to the SHFs and final transportation of the product. This model might be economically attractive to the buyer because of the significant management effort that goes in handling the thousands of farmers, thus the need to outsource the assignment to an agent.

Lastly, the informal model involves casual oral agreements between contracting parties and regularly repeated marketing transactions but is characterized by the absence of written contracts or equally binding and specifying documents(Kelly & Pemberton, 2016). The arrangement is common with perishable products such as vegetables, and fresh fruits. The success of the model is dependent on service providers, mostly offered by the government agencies (Bellemare and Bloem, 2018).

Some authors have recorded that the efficacy of a contract arrangement is determined by the type of interaction between farmers, buyers and other stakeholders involved in the contract scheme. Where CF has been unsuccessful, a number of cases have been reported as the cause; poor management among parties, poor terms and conditions & post determination of prices that are dictated by contract markets. Consequently, this has caused unfavourable selection, moral hazards &breach of contracts. Bellemare and Bloem (2018) affirm that with effective management, contract farming can be a means to develop markets and bring about the transfer of technical skills in a way that is profitable for both the contractor and the farmer. Performance of contract farming in this case was measured by indicators such as number of farmers benefiting from CF, volumes of sorghum delivered by contracted farmers, number of acreages utilized under CF and number of contracts signed.

Provision of interlinked Services and Performance of Contract Farming

Contract farming provides diverse opportunities to farmers ranging from accessibility to a reliable market and most importantly provision to credit access, inputs, marketing and production services (training and extension services). Contract farming can encourage technology and skill transfer supporting the small holder farmers in meeting vital crop standards required in the market (Prowse, 2012).

Masakure (2011), delineates that contract farming has numerous benefits: increase on-farm diversification, technical assistance and skill transfer. This is true because contract farming offers the opportunity to learn basic concepts on production. The skills learnt through CF may include; efficacy in utilization of farm resources, record keeping, inputs application and quality standards. Moreover, spill over effect to the adjacent fields may occur and an improvement in their overall farming practices observed. According to Mwamakimbula (2014), farmers will voluntarily participate in extension training if their needs and preferences have to be addressed. Guo et al. (2009) discovered in a study of contract farming in some eastern provinces in China, that small holder farmers are attracted to contract farming so as to obtain the advantages of technical assistance to improve product quality, credit access and input supply arrangement.

In a study conducted in the North Central Zone of Nigeria, it was revealed that 90% of the contract farmers had received various services and exposed to trainings by the contracting firms as compared to only 28% of the non-contract farmers who received trainings from the government officers. It was recommended that the rice farmers should participate more in contract farming to take advantage of the services so as to increase productivity and income to escape poverty (Tsado, Ojo & Ajavi, 2014).

A different survey conducted by (Moyo, 2014) in Mazowe district in Zimbabwe revealed that most tobacco contract farmers get extension services from their contractors unlike those not contracted. The survey revealed that 100% of the contracted farmers receive extension services while 35% of the non-contracted farmers do not access extension services. This is because the non-contracted farmers entirely rely on government services which are not reliable especially owing to the budgetary constraints facing the government thus the reason for 65% non-contract farmers not having received services.

From the Zimbabwe study, 97.4% of the contracted farmers received inputs from their contractors while 97.3% of the non-contract farmers purchased inputs from their individual capital. This is a confirmation that contract farming is a resourceful marketing arrangement. With the contracting firms providing trainings and inputs arrangement this largely influences farmer's operations thereby impacting positively on the quality and quantity of crops produced. Therefore, the difference in performance between the contract and non-contract farmers can be attributed to the CF intervention (Moyo, 2014).

In developing countries, access to agricultural inputs has been cited as a major challenge to small holder farmers. In a contract production context, the financial and input demands coupled with labour requirements tend to be higher as compared to a non-contract arrangement. Key & Runsten (2013), therefore argue that inputs supply arrangements and financial linkages are important elements of a contract design targeting small holder farmers. According to Chavas (2010) SHFs are limited to produce in large scale due to the lack of access to certified inputs and input loans. In addition, the SHFs have very small land sizes making it challenging to compete with large scale growers.

Small holder farmers may consider participating in contract farming so as to access inputs from the contracting firm especially in a situation where there are not many input suppliers in the area. In developing countries, public provisions of agricultural inputs and services have been noted to be inefficient due to unreliable delivery (Dorward, 2010) and also due to political interference (Banful, 2010).

Inputs arrangements from the contracting firm are more likely to win the trust of farmers, because the quality of the inputs is assured and has an effect on the output quality. The small holder farmers claim that the contracting firm is the claimant of their produce, therefore, will offer high quality inputs as compared to other sources (Wolf, 2011). According to Abebe (2013), Ethiopian potatoes contract farmers preferred seeds supplied by the contracting firm because it is believed to be of high quality and more reliable than from other sources.

Access to extension services is viewed as an intangible incentive and more so helps the farmers to increase productivity. This creates a strong commitment to the contract scheme by the contracted farmers. Evaline (2015) in a research conducted in the lower Eastern parts of Kenya revealed that 50% of the contracted sampled households received production advice from extension services with the most common advice covering agronomic practices and the best varieties that do well in ASAL regions. The trainings were received by 80% of the sampled respondents.

A study conducted in Bungoma/Kakamega districts in Kenya revealed a positive spill over from contract arrangements among sugarcane farmers. The study concluded that there was a positive correlation between the farmer's participation in the contract arrangements to the farmer's access to inputs on credit (Govereh, Jayne and Nyoro, 2009).

In most cases, smallholder farmers have difficulties to get credit for farm inputs. Due to the high risk associated with farmers there is less possibility of banks' lending them money (Key & Runsten, 2013). High interest rates are also a hindrance. In this light, contract farming allows farmers to access credit giving them power to purchase inputs. In most cases, the contractors advance the credit in form of inputs through enforced agreements. In some cases, farmers use the contract agreement as collateral to access credit from other sources (Simmons, 2012). According to Evaline (2015) while it is known that access to credit for sorghum production and marketing is important, in a contract arrangement study conducted in Kenya it was observed that 93% of the Households accessed necessary agricultural credits. 7% of the households did not access any credit for sorghum production and marketing. Financial constraints among small holder farmers are immense and if contract farming can make credit accessible to farmers this would be a great incentive for participation in the contract scheme.

Income of Farmers and performance of Contract Farming

Small holder farmers are limited by marketing opportunities which creates problems when deciding what to produce. With contract farming, there is an assured market and certainty in income. The returns a farmer gets from selling in the spot market or to brokers depends on

the prevailing market prices, the level of urgency that a farmer has to fulfil the existing needs with the money and ability to negotiate with the traders. This creates substantial uncertainty in the income to be earned. Contract farming overcomes this problem since the contractors specify the price in advance (Singh, 2012).

Using the comparative case study analysis, the CF assessments conducted in the beginning in Africa have showed a positive effect on income (Glover, 2010). According to Minot (2014) who re-evaluated CF in developing countries found that generally contract farming caused an increase in the income of small holder farmers. The recurrent failure in CF was also a significant finding. However, despite of the societal problems experienced, Porter (2009) concluded that farmers in Africa were better of due to participating in contract farming.

Following a review by Porter (2009) on CF in Africa, he revealed that SHFs income increases when they engage in CF although the arrangement is associated with numerous social problems. Birthal (2010), Conducted the Gross Margin Analysis (GMA) and found that the income contracted farmers derive through the CF arrangement is higher than what is earned by the non-participants. In India, the GMA for the dairy contract farmers almost doubled the income of the independent dairy farmers. This is majorly owing to lower production and marketing expenses for the contract farmers compared to non-contract.

With use of econometric analysis, there are several studies recently that have explored the impact of contract farming. Miyata (2009) examined the impact of CF on income to the participating SHFs in China. The study was based on a survey conducted for the apple and green onion producers (162) and 4 contracting firms. The findings were the small holder farmers can benefit from contract farming.

Simmons (2002), conducted a study in Indonesia to access the impact of contract farming in maize seed, rice seed and poultry and the findings showed that contracts have a positive effect on the welfare of farmers. The seed corn and broilers contracts had high proceeds to capital while seed rice CF had zero impact on capital proceeds. Further, the three contracts cut absolute poverty.

An efficiency and distribution analysis on poultry production contract farming was conducted in the state of Andhra Pradesh India, revealed that contract farming is more efficient in comparison to non-contract farming. Further, the findings also revealed there was a huge difference in income earnings between the two groups. Under contract farming, there is higher expected returns and lower risk. According to Ramaswami (2013), comparing the average returns of the two groups they concluded that contract farmers gain appreciably in terms of income. According to Bellemare and Bloem (2018), in a study in Senegal on the impact of CF on income found that 32,000 contract peanut growers improved their proceeds considerably compared to non-contract farmers.

Gibbon (2009) conducted a study in Uganda analysing the revenue effect on smallholder farmers participating in contractual organic cocoa production. They found that contract

farming exposes farmers to improved farming methods which in turn enhance their yields and as a result there is a positive revenue effect for contract farmers.

In a different study carried out in South West of Ethiopia in the Sheka zone, the annual income from honey production showed a significant mean difference at 1% level between the contract and non-contract beekeepers. The beekeepers under contract earn more annual income as compared to those not contracted. The difference can be attributed to high prices offered by the contract markets. This is because the sales price of honey shows a significant mean difference (Meshesha, 2011).

In a study conducted in Kandara district in Kenya, the findings show that the contracted farmers report higher incomes, however, the differences in income of the contracted and not-contracted groups are not significant. Therefore, the variations in the income cannot be attributed to the CF arrangement. The study concluded that although produce markets through contracting have shown positive impact on the participants, only the contracts that are managed well have proved to be beneficial to the farmers (Mwambi,Oduol, Mshenga, Saidi, 2016).

Other research shows that some of the CF arrangements favour the large-scale farmers leaving out the SHFs from the development process thus continue to get poorer. According to Bellemare and Bloem (2018), over dependence on contract crops may cause loss of bargaining power with the contractor making the SHFs accept unfair, manipulative and less favourable terms. Therefore, this can make farmers extremely exposed to price instability in turn making the farmers participating in CF to consequently lower household proceeds (Bellemare and Bloem, 2018). In summary, the influence of CF on the degree of income level varies in different studies. In countries where contract farming is in the process of establishment, there are high levels of exploitation by the contractors. Bellemare and Bloem (2018), conducted a research and one case revealed negative effect on contracted farmers income due to monopoly and opportunistic behaviour. In addition, lack of transparency in pricing and quality control influences negative income effects.

Sociological Factors and performance in Contract Farming

Age, education and gender are mostly included in empirical studies. However, there has not been a consensus as to the significance and sign of each of the sociological variables on CF performance. Oswald (2010), noted that sociological factors have an influence on the performance and success of entrepreneurs and enterprises. Rugimbana (2009) reveals that to achieve efficacy in use of inputs and modern agro-technology, it requires a certain degree of education to enable farmers to decode and comprehend the complex nature and make efficient selection, as well as to make appropriate allocation of resources so as to benefit the new opportunities offered by superior inputs.

In a study conducted in Ghana on the determinants of contract farming performance, it was revealed that farm size influenced the decision of farmers to participate in the arrangement

(Asante, 2011). Frayne (2008), found that farm size, the level of education and gross income variables influence the farmers' probability of participation. This is related to Karli (2009) who revealed that the larger the size of land the lower the probability of a farmer participating in CF.

Many authors have found age of the head of the household to have a negative effect on CF performance. This has been revealed by Simmons (2009) for seed corn in Indonesia and Bellemare (2012) in several commodities in Madagascar. On the other hand, Katchova and Miranda (2009) find that age had a significant positive effect for soybean in the United States. Other studies found an insignificant effect in Indonesia for seed rice and broilers (Simmons, 2012).

Rugimbana (2009) in Tanzania concluded that education has a significant level of influence on productivity. Based on the regression analysis of factors influencing performance of CF, the coefficient level of education for the farmer was significant with a value of 2.443 at $p<0.05$. Her argument was based on the notion that educated farmers are more likely to comprehend and follow the guidance from the extension officers on how and when to use the recommended inputs as well as the importance of applying the improved technologies. Kalamata (2009) in Tanzania also found that there is higher probability of adopting recommended practices by farmers with a certain degree of education.

Obwona (2013) in Uganda studied the factors determining technical efficiency differential among farmers and found that education has an influence on technical efficiency among farmers with a positive significant value of 2.19 at $p<0.05$. The results are interpreted as follows; education levels of farmers influence production at a certain degree. The researcher further explains that not only higher education that contributed to this effect but also adult and vocational education. However, Foti (2009) contradicts this by establishing that the level of education has insignificant impact on production using regression analysis.

Age is also indicated to influence productivity and performance of contract farming. Masvongo (2013) in Zimbabwe found that age of the household head was negative and insignificant with a value of 0.528. This was attributed to the perception that age and performance are negatively correlated. The sample comprised of farmers between the age of 26-71years. According to Yaron (2009), claimed that as one grows old, the tendency to repel change increases compared to farmers who are young who swiftly implements suitable technology. Obwona (2013) found that age has a negative insignificant with a value of -0.63 at $P<0.05$ when regressed on production. According to Rugimbana (2008), the age of an individual has an influence on productivity and food consumption. Her study reveals that old farmers are likely to be less productive as compared to those in the active age. Most of the sorghum farmers are of the age between 28 and 50 years. Others argue the young are likely to be less productive thus not involved in CF.

Gender is a key factor likely to influence production and performance of CF. Masvyongo (2013) found that among tobacco farmers, production was a subject of males accounting up to 82%. There was a negative significant value of 0.613 on production from the regression

analysis of sex. Obwona (2013) on the other hand, found that sex has an insignificant effect on technical efficiency of farmers with a value of 0.0017 therefore does not influence technical efficiency of farmers. A study conducted in Zimbabwe to determine the effectiveness of CF revealed that 33% of the tobacco farmers are female while 67% are male. Out of the 33% female farmers, only 25.6% participated in contractual arrangements. This might be interpreted as women not being active participants in contract farming contributing to low productivity.

According to Bellemare (2012), he found out in a study in Kenya that females are less likely to participate in CF, which causes poor performance of the intervention. One possible reason is that in developing countries, institutional forces at times provide females with disadvantageous contract opportunities. According to Aazamil (2011) there are a number of factors influencing farmers participation in CF which include trust, number of family members, land ownership and economic motivation. Nugussie (2009), revealed that the major variables strongly influencing farmers to join CF were male head households, family size and attending public meetings.

The widespread differences among the findings made on sociological factors could be caused by statistical or modelling differences. Further, it could be attributed to institutional differences across the countries and commodities leading to heterogeneity. This suggests that policy makers who seek to promote CF should be wary of the implications of heterogeneity when designing policies.

Nature of the contract and performance of Contract Farming

The nature of the contract comprises of two major aspects which include; form of the agreement in terms of written/oral and the conditions stipulated in the contract. Depending on whether a contract is oral/written determines to a large extent the sharing of various farming and marketing risks among the contracted parties. A written contract is more specific on the roles and responsibilities of the involved parties, quality issues, farming practices, monitoring practices, penalties and arbitration issues. However, it is expensive to enforce and prepare (Poppo, 2012).

On the other hand, Oral contract thrives on continuous interactions and reputation for enforcement. According to Schipmann and Qaim (2011), in most studies oral contracts are obeyed than written contracts. However, in situations where the contractors are not integrated into the farmers social networks the farmers may not trust oral contracts for the fear of the firm not showing up to purchase the products. According to Kirsten and Satorius (2012), farmers will prefer written contracts since they carry a commitment of market certainty which is needed before production. Therefore, a written contract gives more market assurance than an oral contract.

According to Bijman (2008), the most basic benefit of contract farming the small holder farmers is giving a solution to market failures. Bijman noted that the contracts with an assurance of market have a higher chance of acceptability by farmers. However, Narayanan

(2010) notes that a contract can be rejected even with assurance of markets and welfare gains if it is perceived to introduce a new risk. A study in India showed that smallholder's rejected contracts since they perceived the arrangement would bring other risks such as health concerns as a result of the required chemical inputs to produce. Schipmann and Qaim (2011) noted that farmers in Thailand rejected a contract offering higher returns since they valued their freedom & independence to produce and sell anywhere.

Studies that have been conducted in Africa indicate that contractual challenges are rising every day. In Zambia for example, breaching of contracts is common for most commodities owing to the lengthy litigation processes (Likulunga, 2009). The contractual problems have also been witnessed in Malawi, which has been caused by a legislative environment and weak regulations leading to a rise in default levels such as side selling, food insecurity and poverty (MASIP Secretariat Report, 2009).

The most critical factor that determines a SHF acceptance of a contract is the profitability gain derived from the contract in comparison to not entering the contract. In cases where the farmer perceives the terms of the contract to be unfavourable, they may call for negotiation or out rightly reject the contract. In addition, the farmer may accept the contract not because it is fair but owing to the feeling that they are better off being contracted than without a contract.

Glover and Kusterer (2009) noted the importance of FBO's and NGO's in the structuring of farm production in smallholder contract farming. There is need to organize contract farming in a way that integrates farmer representatives in the management and design of the CF schemes. This is important to avoid unequal power relations (Little, 2014). According to Bachke (2010), in a study conducted in Mozambique, smallholder's who were CBO members benefited from high welfare gains as a result of participating in CF arrangements due to better accessibility to production inputs and higher production value. In a similar case, Harou (2010) revealed that Ghana pineapple farmers joined cooperatives under contract schemes because they perceived cooperatives with ability to demand for written contracts for the farmers, a higher bargaining power and ability to prosecute the contracting firms in cases where breach arises.

Empirical studies have revealed participation of FBOs, cooperatives and NGOs into contract arrangements has resulted into significant benefits; trust building among the parties, better contract terms compliance by both parties and better bargaining on behalf of contracted farmers. In addition, involvement of NGOs can reduce poverty traps often associated with regional inequality and geographic locations (Harou and Walker 2010).

Tschirley and Weber (2014) have studied Kenya's domestic horticultural production and marketing system. The findings recorded are that the efficacy of contracts vary in different market settings and the mere inclusion of a contract does not guarantee sustainable trade relationships. The authors recommend that equity schemes and public policies are essential in making CF an intervention with positive results in terms of sustainability, equity and efficiency.

In addition, the conditions set in terms of payment for delivering the correct quality and agreed quantity of the product in the contract design is critical to the smallholders. According to Miyata et al. (2009), the commonly used price options are variable options and fixed. The fixed option specifies the price prior production and is not negotiable after harvesting. In this case, if the prevailing market prices are higher than the contracted price during harvesting, the farmer loses (giving rise to side selling) and the contractor gains. However, the advantage to the farmer is assurance on a specific price and no worry on price fluctuations in the market. With the variable option the price is dependent on factors such as open market price for the product and performance criteria set out in the contract.

Empirical findings reveal that farmers are generally risk averse and as a result they will rather go for a fixed price to play safe (Tripathi et al. 2009). On the other hand, the risk averse farmers may still go for variable price options for several reasons; suspicion that fixed prices are often lower than the market prices, consideration of insurance premium component of the contract price and due to unequal powers relations, that might favour the contracting firm.

Secondly, variable price option being dependent on performance, farmers will be forced to put in their best. Farmers believe they will do better than others and those who are confident in achieving the quality requirements will go for a variable option to get higher returns. Further, farmers reveal that CF gives farmers better access to inputs, improved and quality production and a guaranteed market.

Farmers Attitude and performance of Contract Farming

According to Shukla, Chaudhari et al (2011), majority of the farmers have favourable attitude towards contract farming. Kumar (2013) noted that manu farmers in India opted for contract farming as a result of the positive attitude influenced by price protection on the crops. The findings further are strengthened by Mann & Kogl (2013) who emphasize that high profits gained through contract farming will serve as a catalyst for having many people have a positive attitude and accept CF.

The attitude a farmer forms towards CF is based on their experience with the benefits that come along with the arrangement. Abebe (2013) found that the main reasons farmers participated in CF was attributed to high returns, market certainty, linked services and other diverse opportunities. Therefore, farmers have a particular expectation while joining CF and if the expectations are fulfilled the farmers will have a positive attitude. On the contrary if the expectations are not fulfilled the farmers will form a negative attitude. The attitude formed by the farmers already in CF will determine if other farmers will join the arrangement or not and in turn influencing the performance of CF

THEORETICAL FRAMEWORK

CF could be identified as an organizational innovation adopted by growers. The theory is conceptualized under two perspectives namely: infrastructure perspective by Brown and adopter perspective by Rogers. Numerous factors have been considered to have influence on

the adoption and diffusion of innovations as drawn from the above-mentioned perspectives. According Rogers and Brown, the factors with significant attention are features of the innovation, such as complexity, observability, compatibility, trial ability and relative advantage. Other features put in consideration are the communication channels as well as the social system used to diffuse the innovation. From Rogers's perspective, the important characteristics to be considered in an adopter are level of education, size of land, income, size of the household, land ownership and entrepreneurship skills are considered (Arumugam et al., 2011 and Adong et al., 2013).

According to Brown, there is another perspective that can be used to understand adoption and diffusion of innovations. The concept is to have the innovation attributes set by the diffusion agency which also strategizes how the adopters acquire the innovation. The influential variables under this perspective include location of the innovation in relation to the adopter, the degree of centralized versus decentralized organizational control and the coordination of the innovation distribution (Adong et al., 2013). Other factors raised by this perspective are the required infrastructure for adoption, cost of innovation, targeted beneficiaries, membership requirements, access to information and channels to promote the innovation (Adong et al., 2013).

In different studies, the two perspectives are used independently or dependently. This study combines both the structural and non-structural variables since all influence performance and perceptions of CF. The application of diffusion of innovation may possibly suggest the variables that influence performance of CF arrangements.

RESEARCH METHODOLOGY

Research Design

According to Orodho (2009), research design is the scheme, outline or plan that is used to generate answers to research problems and achieve the objectives of the study. The research design was descriptive, which is known as an organized experiential inquiry where the researcher does not have control of the independent variable as their expression has happened (Mugenda and Mugenda, 2012). The descriptive design was selected since it provided data from the population of study and portrayed the features of the target population fully. The descriptive research design was suitable in this study because the goals were to present a logical explanation that is based on facts and is truthful as possible. Descriptive design is appropriate because it involves description of events in a carefully planned way (Bryman & Bell, 2015). The design was fitting for the study, because the researcher intended to gather wide-ranging information useful in categorizing variables through description.

Target Population

A target population is a group of individuals, objects or items from which samples are taken for measurement (Donald and Delno, 2006). According to (Pole & Lampard, 2010), a target population is classified as all the members of a given group to which the investigation is

related, whereas the accessible population is looked at in terms of those elements in the target population within the reach for study. The target population was 1,200, which comprised of sorghum farmers' in Imenti North from four locations namely; Gachua, Kianjogu, Kwangombe and Ciothirai who were contracted by Shalem Investment Ltd one of the off takers in Meru County. From Shalem's database, the contracted farmers in Imenti North were 1200; therefore, the target population for investigation was drawn from 1,200 respondents.

Sample Size and Sampling Procedures

Sampling is selecting a number of individuals from the target population for a study in such a manner that the individuals selected fairly represent the larger population from which they were selected (Mugenda and Mugenda, 2012). Selecting a sample size that is representative of a population reduces the length of time to be used during the study and cuts on the costs. This section explored the sample size and sampling procedures. The sample size was calculated using Kothari and Garg (2014) formula with the confidence level at 95% and an error of 0.05. The proposed formula was shown below:

$$n = \frac{Z^2 . N . \sigma^2 p}{(N-1)\, e^2 + Z^2 \sigma^2 p}$$

(Kothari and Garg, 2014)

Where: n = size of the sample required; N = size of the population given as 1200; e= Acceptable error given as 0.05; σp= The standard deviation of the population and given as 0.5 where not known; Z = Standard variation at a confidence level given as 1.96 at 95% confidence level; The target population was 1200 and following the formula, the sample under this study was calculated as follows;

$$n = \frac{(1.96)^2 \times 1200 \times (0.5)^2}{(1200-1)\,(0.05)^2 + 1.96^2 (0.5)^2}$$

The sample size n was therefore =1152.48/3.9579

$$n = 291$$

The technique used for selection of contracted farmers was referred to as stratified proportionate random sampling technique. This is a nonbiased sampling method, whereby a heterogeneous population is grouped into homogenous subsets then a selection is made within the subsets to ensure representation (Kothari, 2014). The method divides the population into a series of relevant strata, which ensures more representation and unbiases (Saunders, 2011). The procedure to be used in calculating the sample size was called proportionate distribution as shown below. For example;

Sample size in Gachua location; 440/1200x 291=107

Data Collection Instruments

According to (Creswel, 2013), data collection instruments are tools used in the data collection about a phenomenon investigated. A questionnaire is a research instrument that gathers data over a large sample (Kombo and Tromp, 2016). A questionnaire is an instrument with a series of questions and other prompts for the purpose of gathering information from

respondents. The questionnaires had both the closed ended questions and open ended. The research assistants were present to administer the questionnaires and help where necessary. Therefore, the respondents sought clarity if the questions were not clear. The research assistants helped the respondents who did not know how to read and write to capture their opinions. The questionnaires were divided into seven sections (Part A to Part G) addressing the study objectives. Part A addressed demographic information, Part B; interlinked services and performance of sorghum contract farming, Part C; Income and performance of sorghum contract farming, Part D; sociological factors and performance of contract farming, Part E; nature of the contract and performance of CF, Part F; Farmers attitude and performance of CF and lastly part G; performance of CF in Imenti North, Meru County. Questionnaires were used since the study was concerned with factors that cannot be studied directly, ie people opinions and feelings.

Data Collection Procedures

Before starting the process of data collection, the researcher got an introductory letter from the University of Nairobi which enabled application of a research permit from NACOSTI. The researcher requested permission from the Meru County Ministry of Agriculture to collect data from sorghum contract farmers. Two research assistants were trained for one and half days on acceptable interviewing skills, understanding of the questionnaire and ethical considerations. The researcher was also with the research assistants helping the respondents& research assistants where necessary. A cover letter was attached to the questionnaire asking for consent from the respondents to participate in the study as well as introducing the purpose of the research. The questionnaires were distributed to the respondents on specific dates through hand delivery. The respondents were given sufficient time to go through the questionnaires and familiarise with every detail needed. To make the exercise easy, the respondents were grouped to receive the questionnaires at central places. The venues were selected depending with close proximity to the localities of the respondents. The data collection involved two research assistants and the researcher with a target to complete the data collection in 4 days with every questionnaire taking an average of 15 minutes. The study involved only two research assistants and the researcher because the intention was to have 12 venues in the four days, which implied in a day only 3 researchers were required. The target was to have an average of 25 farmers in every venue per day where the questionnaires were administered. The filled questionnaires were gathered the same day for data analysis.

Data Analysis Techniques

Data analysis sought to fulfil research objectives and provide answers to research questions. The data collected was reviewed and comparison made to select the most accurate information from the respondents. This involved evaluating both the primary and secondary sources of data. A descriptive statistical approach was used to establish the factors influencing participation of SHFs in contract farming in Imenti North, Meru County. The quantitative data was coded so as to group the responses in dynamic categories. The data was analysed using Statistical Package for the Social Sciences (SPSS). The study also conducted a

correlation analysis to determine the relationship between the variables under study. The findings were presented diagrammatically in tables for ease of understanding. The study used multiple regression analysis to determine the relationship between the dependent and independent variables.

RESEARCH RESULTS

The first objective was to determine the influence of interlinked services on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County. The study found that farmers received benefits from participating in contract farming where they found that trainings was the most frequent benefit, then input supply arrangements, input loans and crop insurance cover was the least received benefit. In terms of the most beneficial service, the ranking is as follows; trainings, Insurance cover, input loan and the least beneficial being inputs arrangement. In regard to income, the study sought to determine the influence of income on performance of contract farming among sorghum small holder farmers in Imenti North, Meru County. The study determined that the farmer's annual average income increased after joining contract farming and this was linked to high yields as most of the respondents indicated.

The research sought to determine the influence of sociological factors on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County. The study found that most of the farmers that participated in contract farming as indicated by the respondents were aged between 30-40 years while most of the farmers who were also actively involved had reached the primary level. Further, the study found that it was strongly agreed that the age of a farmer influences performance of contract farming and education level of a farmer influences performance of contract farming. It was agreed that the gender of a farmer influences performance of contract farming while it was undecided that the land size of a farmer influences performance of contract farming.

The study sought to determine the influence of the nature of the contract on performance of contract farming among sorghum smallholder farmers in Imenti North, Meru County. The study found that most of the farmers preferred written contracts compared to oral ones. Also, it was found that majority of the respondents preferred the variable price option. The study also found that the participation of FBOs, NGOs and cooperatives in contract farming arrangements was beneficial.

The study further found that farmers satisfaction influences performance of contract farming and that farmer's experience influences performance of contract farming. The study also found that it was strongly agreed that the volumes of sorghum delivered under CF has greatly decreased. It was agreed that; the number of acreages utilized under contract farming has greatly increased, the number of contracts signed by SMHs under CF has greatly increased and the number of contract farmers has greatly increased.

REGRESSION ANALYSIS

Regression analysis was used to test the relationship between the variables where it shows how the dependent variable is influenced by the independent variables. The independent variables include the interlinked services, income, sociological factors and nature of the contract while the dependent variable is the performance of contract farming.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.862	0.742	0.737	0.197

Table 1 above is a model fit which establish how fit the model equation fits the data. The adjusted R^2 was used to establish the predictive power of the study model and it was found to be 0.737 implying that 73.7% of the variations in performance of contract farming among sorghum smallholder farmers in Imenti North are explained by changes in interlinked services, income, sociological factors and nature of the contract.

Table 2: ANOVA Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	23.121	4	5.780	147.047	.000
Residual	8.019	204	0.039		
Total	31.14	208			

The probability value of 0.000 indicates that the regression relationship was significant in determining how interlinked services, income, sociological factors and nature of the contract influence performance of contract farming among sorghum smallholder farmers in Imenti North. The F calculated at 5 percent level of significance was 147.047. Since F calculated is greater than the F critical (value = 2.3719), this shows that the overall model was significant.

Table 3: Coefficients of Determination

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.345	0.182		12.885	.000
Interlinked services	0.664	0.196	0.584	3.388	.002
Income	0.774	0.208	0.562	3.721	.000
Sociological factors	0.509	0.115	0.497	4.434	.000
Nature of Contract	0.733	0.312	0.572	2.349	.024

The established model for the study was:

$$Y= 2.345+ 0.664X_1 + 0.774X_2 +0.509X_3 +0.733X_4+ €$$

Where: Y= Performance of contract farming among sorghum smallholder farmers in Imenti North; β_0=constant; X_1= Interlinked services; X_2= Income; X_3= Sociological Factors; X_4= Nature

The regression equation above has established that taking (interlinked services, income and nature of contract), performance of contract farming among sorghum smallholder farmers in

Imenti North will be 2.345. The findings presented also show that taking all other independent variables at zero, a unit increase in the interlinked services would lead to a 0.664 increase in the score of performance of contract farming among sorghum smallholder farmers in Imenti North. Thus, variable was significant since 0.002 <0.05. This conforms to Dorward (2010) who posits that small holder farmers may consider participating in contract farming so as to access inputs from the contracting firm especially in a situation where there are not many input suppliers in the area.

Further, the findings show that a unit increase in the score of income would lead to a 0.774 increase in the score of performance of contract farming among sorghum smallholder farmers in Imenti North. Thus, variable was significant since 0.000<0.05. This concurs with Minot (2014) who re-evaluated contract farming in developing countries found that generally contract farming caused an increase in the income of small holder farmers.

From the findings, the coefficient for sociological factors is 0.509 which is significant since p=0.000 is less than 0.05, meaning that when a unit change in sociological factors changes leads to 0.509 units change in performance of contract farming among sorghum smallholder farmers in Imenti North. This is confirmed by Oswald (2010) who noted that sociological factors have an influence on the performance and success of entrepreneurs and enterprises.

The study also found that a unit increase in the score of nature of contract would lead to a 0.733 increase in the score of performance of contract farming among sorghum smallholder farmers in Imenti North. Thus, variable was significant since 0.024<0.05. This is in line with Poppo (2012) who states that a contract being oral/written determines to a large extent the sharing of various farming and marketing risks among the contracted parties.

Overall, income had the greatest effect on performance of contract farming among sorghum smallholder farmers in Imenti North in Kenya followed by nature of contracts, then interlinked services and sociological factors had the least effect on the performance of contract farming among sorghum smallholder farmers in Imenti North in Kenya.

CONCLUSION

The study deduced that interlinked services has a positive and significant influence on the performance of contract farming. Hence, the study concludes that contract farming provides diverse opportunities to farmers ranging from accessibility to a reliable market and most importantly provision to credit access, inputs, marketing and production services (training and extension services). The study also concludes that contract farming offers the opportunity to learn basic concepts on production. The study concludes that farmers take part in contract farming so as to increase productivity and income to escape poverty as well as improve their livelihood.

From the findings, it was concluded that income has a positive and significant influence on the performance of contract farming. The study concludes that with contract farming, there is an assured market and certainty in income. The study concludes that the returns a farmer gets

from selling in the spot market or to brokers depends on the prevailing market prices, the level of urgency that a farmer has to fulfil the existing needs with the money and ability to negotiate with the traders. Therefore, contract farming overcomes this problem since the contractors specify the price in advance.

The study deduced that sociological factors have a positive and significant influence on the performance of contract farming. The study concludes that sociological factors have an influence on the performance and success of entrepreneurs and enterprises. The study further concludes that to achieve efficacy in use of inputs and modern agro-technology, it requires a certain degree of education to enable farmers to decode and comprehend the complex nature and make efficient selection, as well as to make appropriate allocation of resources so as to benefit the new opportunities offered by superior inputs.

The study established that the nature of contract has a positive and significant influence on the performance of contract farming. The study concludes that whether a contract is oral/written, it determines to a large extent the sharing of various farming and marketing risks among the contracted parties. The study concludes that farmers prefer written contracts since they carry a commitment of market certainty which is needed before production. Therefore, a written contract gives more market assurance than an oral contract.

The study concludes that, farmers have a particular expectation while joining CF and if the expectations are fulfilled the farmers will have a positive attitude. Also, the study concludes that the attitude formed by the farmers already in CF will determine if other farmers will join the arrangement or not and in turn influencing the performance of CF.

RECOMMENDATIONS

The study recommends that the farmers remain loyal to the contract markets who are doing their part by offering trainings, linkages and premium prices. This is because when farmers side sell their produce to brokers, deliveries to contract markets reduces affecting the performance of CF arrangements. The contract markets should as well endeavour to find out reasons attributing to the disloyalty and strive to seal all the side selling gaps to win the loyalty of farmers since quantities are affecting CF performance.

The study recommends that the farmers should focus on the quality of the products produced. The farmers should ensure that the products are of the required standards to make sure that the consumers who are also the buyers are satisfied. This will ensure raking of high profits hence promoting and encouraging more farmers to participate in contract farming.

The study recommends that there should be renegotiation to ensure that some bottlenecks are addressed including repayment terms on loans and customized loan products for farmers to encourage more SHFs to accept input loans for production. This can create a mutual relationship between contracting parties thus enhancing engagement in contract farming among sorghum farmers. Further, the study recommends for renegotiation when the farmer perceives the terms of the contract to be unfavourable. For instance, more written contracts are preferred, therefore contractors should sign written contracts with sorghum farmers.

The study recommends that FBO's and NGO's should be involved in the contract farming activities so as to assist in the structuring of farm production in smallholder contract farming. There is need to organize contract farming in a way that integrates farmer representatives in the management and design of the CF schemes. Also, the study recommends that there should be involvement of NGOs to reduce poverty traps often associated with regional inequality and geographic locations.

The study recommended that the government should contribute towards more farmer trainings through the Ministry of Agriculture Officers, involve research institutions to come up with new & high yielding sorghum varieties, assist the farmers by minimising the price of the essential farm input equipment's as well as providing tractors for hire to be accessible to farmers at a cheaper rate. This will assist the farmers in the contract farming to incur little production costs, increase yields as well as consistently boost their income and curb the poverty cycle.

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