ANALYSIS OF CONTRACTUAL AGREEMENT BETWEEN SORGHUM PRODUCERS AND INDUSTRIAL BUYERS IN KADUNASTATE, NIGERIA

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL ECONOMICS

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DECLARATION

I hereby declare that this dissertation titled "**Analysis of Contractual Agreement between Sorghum Producersand Industrial Buyers in KadunaState, Nigeria"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another Degree or Diploma at any institution. All citations and sources of information are duly acknowledged by means of references.

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CERTIFICATION

This dissertation titled '**Analysis of Contractual Agreement between Sorghum Producersand Industrial Buyers in KadunaState, Nigeria',** by Omolola, Olarewaju meets the regulations governing the award of the Degree of Master of Science, Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to God The Father, Jesus Christ the son and the Holy Spirit.

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ABSTRACT

This study analyzed of contractual agreement between sorghum producers and industrial buyers in Kaduna State, Nigeria.Multistage sampling technique was employed for this study. The first stage involves purposive of Giwa, Markafi, and Ikara because of the predominance in sorghum production and firm's contract supplies.The second stage were purposive selected four villages from each Local Government Areas. The third stage, a random selection of the contract farmers was made through balloting system. Primary data were collected using structured questionnaire. The statistical tools used to analyze the data were descriptive statistics, multinomial logit model.The result of the analysis shows that (41%) of the respondents fell within the age range of 41-50years, 67% hadhousehold sizethat ranged from1-10 persons and majority of the farmers (59%) had formal education. About 61% do not had access to credit. About 74% did not had access to extension service, (53.9%) were not members of a cooperative society. About 36% had farming experience between 11-20 years while 87% of the farmers hadfarm size that range from 1-3 hectares. The distribution of sorghum producers by their preference characteristics revealed that 80% of the producers selected the preference alternative. Following the six (6) contract attributes identified between the sorghum producers and industrial buyer in the study area i.e, location of delivery, packaging of size, price setting, mode of payment, quality of grain and dispute resolution.80% of producers sold the harvests at their place and 16% at the market while 5% of producers found buyers at collection points. In terms of packaging size, about 73% of sorghum producers used 100 kg bags and 20% used 50 Kg while 7% of sorghum producers used 25 Kg bags. In terms of price levels, about 94% of the respondent use market price while 6% of the producers opted for market price plus premium for 20% of the sample. Cash transaction was dominant for majority of the producers (99%). While quality was systematically checked at sale (91%). 97% of producers resolved contract disputes through a third party while 3% required no third party. The result also shows that, producers generally preferred the following four levels of attributes: packaging size of 100 kg (100%), cash payment (100%), market price (90%) and dispute resolution with a third party (98%). The Pseudo R-squared value indicates that 53 percent of the variation in the farmers' preference of contract attributesof sorghum farmers is explained by the independent variables. The relatively small value may be due to measurement errors in the explanatory variables. The significant chi-square value of 53% indicates that the explanatory variables jointly influence the farmers' preference of contract attributes. Numerically and statistically, producers place ($p<0.01$), market price ($p<0.10$)and dispute resolution with third party ($p<0.01$) were the most influential determinant of farmers'preference of contract attributes in the study area. The major constraints identified on sorghum contract farmers in the study area were high cost of fertilizer (96%), inadequate capital (91%), high cost of labour (85%), late commencement of preseason training (52%) while security were (35%). Small scale contract farmer's bargaining power should be enhanced in order to increase their benefit from contract farming

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

With fast pace of technology innovation and product differentiation, contract farming has become indispensable element of modern agriculture (Xiaoxue, Ling, Zibberman, 2003). Contract farming can be defined as an agricultural production system carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of farm product or products (FAO, 2012). In an age of market liberalization, globalization and expanding agribusiness, there is a danger that small-scale farmers will find difficulty in fully participating in the market economy. In many countries, such farmers could become marginalized as larger farms become increasingly necessary for a profitable operation (FAO, 2001).

Contract farming can also be defined as an agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it (Nicholas, 2011). Under this system, the corporations, instead of owning land and farming directly, recruits local peasant farmers and sign contracts committing them to use approved farming techniques to produce stipulated quantities of products to be delivered on approved dates to the companies as sole buyers (FAO, 2012). The company often also agrees to support the farmer through means such as, supplying inputs, assisting with land preparation, providing production advice and transporting produce to its premises. To understand the rationale for contract farming, it is useful to view it as one form of vertical coordination, in between spot markets (in which supply and demand are coordinated through prices alone) and vertical integration (in which

supply and demand are coordinated by having one firm carry out multiple stages in the market channel).

Contract farming in developing countries is associated with high-value crops, often destined for export, that perish easily or require careful husbandry and might not be suitable for plantations, (Watts 1994; Prowse 2012).

Nigeria is the second largest producer of sorghum in the world after USA with an annual production in excess of 8 million metric tons. Sorghum ranks among the top three important grains in the country while its industrial demand is increasing particularly in the food, beverage, and livestock feed industries (USAID, 2009). The leaves and grains are also used for livestock feeds and the stalks for thatching houses and making fences (NAERLS, 1997). However since most of the sorghum grain produced in Nigeria is for direct human consumption, it is the largest producer of food sorghum in the world. Millions of rural poor in the dry Savannas of Nigeria consume sorghum in their daily diets as staple food. In addition to this popularity of sorghum use in traditional dishes prepared in the home, it also used for industrial sorghum products. Sorghum is processed into malt for malted drinks and foods, high quality flours, and as a raw material for the poultry and fish feed industry. The country produced 8.5 million tonnes in 2008, 9.3 million tons in 2009 and by 2010 it approached 10.0 million tonnes (Table 1) with a projection of being the largest sorghum grain producer in the world (FAOSTAT, 2011). The sorghum contribution to national GDP is about half that of maize (0.09%) i.e. around 0.05%. It is more a food crop than a cash crop and should contribute about 30% to farmers' income. On the

other hand, it contributes about 70% to food and nutritional security of the farmers' households in the Sudan savannah of the country.

Table 1.1: Current and projected status of sorghum in Nigeria

Parameter	**Year**	**Projection**	
	2001-10	2014	2017
Average area (ha)	5500	10845	18046
Average production (MT)	6900	11984	18132
National Demand (MT)	1150	1866	3224
Yield (kg/ha)	900	1260	1530
(% increase)		(40%)	(70%)

*ROG= Rate of Growth
Source : FAOSTAT, 2011

Nigeria's share of all cereal crops has significantly increased. For example, sorghum's share of area planted has increased from 42 to 57% of the total West Africa (WASAT) cereal area planted. Pearl millet's share has increased from 23 to 37%, rice area has increased from 46 to 60%, and the maize area has more than doubled, from 32% to 67% of WASAT cereal area planted. Sorghum had greater untapped potentials than any other crop. It is even postulated that if the twentieth century was the century of wheat, rice and maize, then the twenty-first century could become the century of sorghum. (FAO 2012)

Sorghum is drought-tolerant and resistant to water-logging and grows in various soil conditions (Dillon et al., 2007). These characteristics contribute toward it being the

staple crop of Africa's most food-insecure people, who live in the desert-margin, semiarid tropics. Because of its similarity to maize (hard and floury endosperm and large fat-rich germ), sorghum can be processed using technologies of dry and wet milling applied to maize (Taylor, 2003). In Nigeria sorghum are stored as unthreshed heads in a solid walled container called a Rhumbu. For short-term storage, bundles of sorghum and millet heads are arranged in layers in the Rhumbu. For long-term storage of three to six years, the heads are laid out individually rather than in bundles. Some farmers spread the leaves of *Gwanderdaji* (*Anonasenegalensis*) on the bottom of the Rumbu and between each layer of grain. When a Rumbu is full, the mouth is sealed with clay. Modern storage is done in bags or silos like maize are stored.

Sorghumcanbeutilizedtoproducenutritiousfortifiedfoods,typicallyblendedwithsoyabea n.

KeymarketsforthesefortifiedfoodsareHomeGrownSchoolFeedingprograms(HGSF)and the WorldFoodProgram(WFP) foodaidtoneighboringcountries likeChad,Niger,Malietc High Quality Sorghum Flour (HQSF) is used for baking bread (sorghum 20%: wheat 80% composite), Packaged Tuwo Flour, Extruded and Steamed Foods, Sorghumcanalsobeusedinproducingmaltforuseinthebeverageindustrytoproduce(withth e exceptionofbeer)*Maltina*,*Ovaltine*,*Milo* and soon (ATA, 2013).

1.2 Problem Statement

Sorghum constitutes the main food grain for over 750 million people who live in the semi- arid tropics of Africa, Asia, and Latin America (Food Security Department, 2004). According to the United States Agency for International Development (2008), sorghum is the fifth important cereal crop in the world after wheat, rice, maize and

barley. Nigeria is the second largest producer of sorghum in the world with an annual production in excess of 8 million metric tons with most of the production taking place in northern part of the country. North-west zone is the highest sorghum producer in Nigeria (NAERLS and NAPS, 2010). Being poor in resources, most of sorghum farmers have only minimum access to production inputs and improved credit facilities for their purchase (NAERLS and NAPS, 2010).

It has been widely argued that agriculture is undergoing a process of vertical integration with allied industries to which contract farming is most acceptable (Kaouthal, *et al*;1997). As a continually evolving process, contract farming has taken many dimensions and has become the most popular form of integration in Sorghum production (FAO, 2011).

As with any contract, there are a number of risks associated with contract farming which include farmers selling to a buyer other than the one with whom they hold a contract (known as side selling, extra-contractual marketing), or using inputs supplied by the company for purposes other than intended. On the other hand, a company sometimes fails to buy products at the agreed prices or in the agreed quantities, or arbitrarily downgrades produce quality (Jupiter, 2012).

The existence of an adequate framework for the successful implementation and long-term sustainability of contract farming is very vital in contract farming (ICRISAT, 2010). It is also important to protect them from risks that may occur during contractual execution, such as abuse of power by the stronger bargaining party or breach of contract. Strengthening farmer organizations to improve their contract

negotiating skills can redress the potential for subsequent misunderstandings (Nicholas, 2011). Contract Farming has been recognised in Nigeria as a system that has the potential to increase productivity and reduce rural poverty. Apart from provision of inputs, contract farming has the following benefits; access to credit and loans, provision of extension and technical advice, appropriate knowledge and management systems (Rukuni*et al*., 2006). However, some critiscism have shown that contract farming exploits small farmers because of unequal relationship between farmers and large agribusiness firm; additional income from contract farming creates inequality; friction within community; and disputes within household and also that contract farming excludes small farmers because buyers prefer to work with medium and large farmers (Nicholas, 2011)

The major problem constraining agricultural growth is how to design an effective mechanism and institutional arrangement to alleviate rural poverty through contract farming. As a result of this, Non-Governmental and private sector is being called upon to participate in poverty alleviation programmes in terms of increase employment generation, access to market, investment and output expansion, especially in the agricultural sector, through contract farming and processing of sorghum in Kaduna State. Based on the foregoing the study attempts to answer the following questions;

i. What are the socio economic characteristics of contract sorghum producers in the study area?

ii. What are the farmers' preferences for contract attributes?

iii. What are the determinants of farmers' preference forcontract attributes?

iv. What are the constraints faced by sorghum farmers under contract farming?

1.3 Objectives of the Study

The broad objective of the study was to evaluate the contract between sorghum producers and industrial buyers in Kaduna State. The specific objectives were to;

i. describe the socio-economic characteristics of sorghum contract producers in the study area;

ii. evaluate the farmers' preferences for contract attributes;

iii. estimate the determinants of farmers' preference for contract attributes;

iv. describe the constraints faced by sorghum farmers under contract farming.

1.4 Justification of the Study

Asides domesticfood availabilityexpectedfrom Nigeriaagriculturetheproblemofincreasingunemploymentrate especially amongtheyouths is also expected from the Agricultural sector.Thisisbasedon thefactthatthe NorthCentralregionofthecountrywhereagricultureistheprimaryoccupationhad thelowest employmentrate inthecountry(ATA, 2011). From the early 1980s, through policy instruments, most countries have promoted capitalist agriculture via agribusiness intervention to resolve the agrarian crisis afflicting the country. The agribusiness companies so invited and promoted, have among other initiatives, inaugurated a new form of intervention in their operations known as contract farming (Xiaoxue, *et al.,* 2013).

Despite lagging behind many other commodity-based research programs, such as maize and cotton, sorghum research in sub-Saharan Africa has been successful in diffusing a large number of new cultivars onto farmers' fields (Olembo*etal.*, 2010).The potential for sorghum to be the driver of economic development in Africa especially Nigeria cannot be over emphasized (Sani*et al.,* 2013). In recent years, contract farming has spread widely in developing countries, as a potentially viable model for coordinating production and ensuring higher-quality, safer food and lower production and marketing costs (UNCTAD, 2009). Early literature on contract farming looks at the motivations for adopting contract farming as a mode of vertical intergration, industrial organization and how it benefits either of the parties involved. Glover *et al.* (1994) also focuses on how contract farming could induce risk-sharing and improve efficiency. Although, Contract farming has been recognised in Nigeria as a system that has the potential to increase productivity and reduce poverty. Apart from the provision of inputs, contract farming has the following benefits: access to credit and loans, provision of extension and technical advice, appropriate knowledge and management system. (Rukuni, *et al.* 2006). Also, contract farming continues to gain importance as a mechanism for governing transactions in agro-food supply chain and as a tool to promote the access of smallholder farmers to markets (FAO, 2012).

This study will generated the needed information by surveying sorghum producers to analyse their preferred contracts and contract attributes choices in contract farming. The result are going to provide a better understanding on how to build sustainable contracts and thus improve the efficiency of sorghum value chain in Kaduna State.

Furthermore, the study will provide useful information in guiding agricultural planners, NGOs, Research and Academia and policy makers in evolving policies that will promote contract farming and sorghum production in Nigeria.

CHAPTER TWO

LITERATURE REVIEW

2.1 Contract Farming

Contract farming has been in existence for many years as a means of organizing the commercial agricultural production of both large-scale and small-scale farmers (FAO, 2012). Agricultural production carried out according to a prior agreement in which the farmer commits to producing a given product in a given manner and the buyer commits to purchasing it (Nicholas, 2011). Recent years have seen considerable interest in the impact of contract farming on farmers in developing countries, motivated out of belief that contract farming spurs the transition to modern agriculture.

Attempts by governments and development agencies to arrest the drift of rural dwellers into the urban areas have tended to emphasize the identification of "income generation" activities for rural people. Unfortunately there is relatively little evidence that such attempts have borne fruit. This is largely because the necessary backward and forward market linkages are rarely in place, i.e. rural farmers and small-scale entrepreneurs lack both reliable and cost-efficient inputs such as extension advice, mechanization services, seeds, fertilizers and credit, and guaranteed and profitable markets for their output (FAO, 2001). It is widely asserted that participation in contract farming schemes provide a good earning, income stability and access to

credit (Smalley, 2013). Both contractors and farmers must consider the risk-return trade-offs of each potential crop contract. Farmers' choices may also depend on their risk attitudes and financial positions. Thus, contractors and farmers have both expressed the need for new information to assist in contract evaluation and decision making (Coaldrake, and Sonka, 1993).

2.2 Models of Contract Farming

Glover and Kusterer, (1990) suggest that contracts can be thought of as varying in 'intensity'. At one extreme, the company pays the market price on delivery and exercises little control over production. At the other, extreme prices are fixed and the contractor exercises constant and rigorous control over all aspects of production. It is generally agreed that two major reasons explain why farmers opt to contract with a downstream processor and marketer: risk reduction (Allen and Lueck 1995; Hennessey and Lawrence 1999) and transaction cost reduction (Hobbs and Young 1999). Some of the new contracting alternatives may require farmers to invest in specialized equipment. This increase in the complexity of decision making suggests the need for new information about the effects of transaction and producer characteristics on preferred contract terms and financing arrangements (Kaouthar, *et al* 1997). Eaton and Shepherd (2001) proposed a typology of five models that can be used to set up contract farming schemes. The five models are:

2.2.1 Centralisedmodel

Under this model, the contractor, which could be a private company or parastatal, processes the crop itself, demands large volumes, applies tight quality control and often has a monopsony. Sponsors' involvement in production varies from minimal input provision to the opposite extreme where the sponsor takes control of most

production aspects. The centralized scheme is generally associated with tobacco, cotton, sugar cane and bananas and with tree crops such as coffee, tea, cocoa and rubber, but can also be used for poultry, pork and dairy production. Where fresh vegetables and fruits are grown under contract, the term "processing" may include grading, sorting and packaging as well as the provision of cool storage facilities. (Charles 2001)

2.2.2 Neucleusestate

A variant of centralisation which is often seen in resettlement schemes and uses the nucleus to demonstrate new crops. The central estate is usually used to guarantee throughout for the processing plant but is sometimes used only for research or breeding purposes. It also involves significant provision of material and management inputs. In this case the sponsor of the project also owns and manages an estate plantation, which is usually close to the processing plant (FAO, 2001). The estate is often fairly large in order to provide some guarantee of throughput for the plant, but on occasion it can be relatively small, primarily serving as a trial and demonstration farm Nucleus estates have often been used in connection with resettlement or transmigration schemes, such as in Indonesia and Papua New Guinea, for oil palm and other crops. While mainly used for tree crops, there are examples of the nucleus estate concept with other products.(Dorward, *et al*1998)

2.2.3 Multipartite model

A joint venture that is more inclusive of smallholders than other models and whose public and private partners share the responsibility for input and service provision. The multipartite model usually involves statutory bodies and private companies

jointly participating with farmers. Multipartite contract farming may have separate organizations responsible for credit provision, production, management, processing and marketing. In Mexico, Kenya, and West Africa, among other countries, governments have actively invested in contract farming through joint ventures with the private sector. (Dunham, 1995). However, in multipartite model all farmers were expected to belong to associations or cooperatives, and public institutions become involved as providers of credit and extension. This arrangement significantly reduced both the risk of extra-contractual marketing and the company's costs of dealing with individual farmers, while being generally welcomed by farmers. Problems remained, however, most notably in relation to the lack of management skills on the part of the farmer associations and cooperatives. (FAO, 2001)

2.2.4 Informal model

In which small companies or entrepreneur traders arrange little more than marketing contracts with farmers and rely on others to provide extension, credit and other resources. Crops usually require only a minimal amount of processing. Material inputs are often restricted to the provision of seeds and basic fertilizers, with technical advice limited to grading and quality control matters(FAO, 2001). A common example of the informal model is where the sponsor, after purchasing the crop, simply grades and packages it for resale to the retail trade. Supermarkets frequently purchase fresh produce through individual developers and, in some cases, directly from farmers. Financial investment by such developers is usually minimal. This is the most transient and speculative of all contract farming models, with a risk of default by both the promoter and the farmer. Nevertheless, in many developing countries such

developers are long established and in numerous cases they have proved an alternative to the corporate or state agency approach. (Eaton and Charles, 2001)

2.2.5 Intermediary model

Where mostly private-sector contractors deal with a cooperative, village committee or similar third party and thus sometimes lose control over farmers' behaviour. Throughout Southeast Asia the formal subcontracting of crops to intermediaries is a common practice. The use of intermediaries must always be approached with caution because of the danger of sponsors losing control over production and over prices paid to farmers by middlemen. In addition, the technical policies and management inputs of the sponsors can become diluted and production data distorted. In short, subcontracting disconnects the direct link between the sponsor and farmer. This can result in lower income for the farmer, poorer quality standards and irregular production.(FAO, 2001).

2.3 Benefits of Contract Farming

A holistic assessment of a contract farming scheme should consider its impact on not only the contracting company and participating farmers but also the wider community where it is located (Little 1994; Singh 2002). Contract farming has significant benefits for both the farmers and sponsor (investors).

2.3.1 Benefits to farmers

The prime advantage of a contractual agreement for farmers is that the sponsor will normally undertake to purchase all produce grown, within specified quality and quantity parameters. The main advantages to farmers are;

1. **Provision of inputs and production services:** Many contractual arrangements involve considerable production support in addition to the supply of basic inputs such as seed and fertilizer. Sponsors may also provide land preparation, field cultivation and harvesting as well as free training and extension. This is primarily to ensure that proper crop husbandry practices are followed in order to achieve projected yields and required qualities.(FAO 2001).

2. **Access to credit:** The majority of smallholder producers experience difficulties in obtaining credit for production inputs. With the collapse or restructuring of many agricultural development banks and the closure of many export crop marketing boards (particularly in Africa), which in the past supplied farmers with inputs on credit, difficulties have increased rather than decreased.(Eaton, and Charles, 2001) Contract farming usually allows farmers access to some form of credit to finance production inputs. When substantial investments are required of farmers, such as packing or grading sheds, tobacco barns or heavy machinery, banks will not normally advance credit without guarantees from the sponsor (Nicholas, 2011).

3. **Introduction of appropriate technology:** New techniques are often required to upgrade agricultural commodities for markets that demand high quality standards. New production techniques are often necessary to increase

productivity as well as to ensure that the commodity meets market demands. However, small-scale farmers are frequently reluctant to adopt new technologies because of the possible risks and costs involved. They are more likely to accept new practices when they can rely on external resources for material and technological inputs. Nevertheless, the introduction of new technology will not be successful unless it is initiated within a well- managed and structured farming operation (Burch 1994).

4. **Skill transfer:** The skills the farmer learns through contract farming may include record keeping, the efficient use of farm resources, improved methods of applying chemicals and fertilizers, a knowledge of the importance of quality and the characteristics and demands of export markets. Farmers can gain experience in carrying out field activities following a strict timetable imposed by the extension service.

5. **Guaranteed and fixed pricing structures:** The returns farmers receive for their crops on the open market depend on the prevailing market prices as well as on their ability to negotiate with buyers. This can create considerable uncertainty which, to a certain extent, contract farming can overcome. Frequently, sponsors indicate in advance the price(s) to be paid and these are specified in the agreement. On the other hand, some contracts are not based on fixed prices but are related to the market prices at the time of delivery. In these instances, the contracted farmer is clearly dependent on market volatility.

2.3.2 Benefits to sponsors

Companies and government agencies have a number of options to obtain raw materials for their processing and marketing activities. The benefits of contract farming are best examined in the light of the other alternatives, namely spot- market purchases and large-scale estates(FAO 2001). The main potential advantages for sponsors can be seen as:

1. **Political acceptability:** It can be more politically expedient for a sponsor to involve smallholder farmers in production rather than to operate plantations. Many governments are reluctant to have large plantations and some are actively involved in closing down such estates and redistributing their land. Contract farming, particularly when the farmer is not a tenant of the sponsor, is less likely to be subject to political criticism. As a result of the restructuring of their economies, many African governments have promoted contract farming.

2. **Overcoming land constraints:** Most of the world's plantations were established in the colonial era when land was relatively plentiful and the colonial powers had few scruples about either simply annexing it or paying landowners minimal compensation. That is, fortunately, no longer the situation. (Eaton, 2001) Most large tracts of suitable land are now either traditionally owned, costly to purchase or unavailable for commercial development. Contract farming, therefore, offers access to crop production from land that would not otherwise be available to a company, with the additional advantage that it does not have to purchase it. (Nicholas, 2011)

3. **Production reliability and shared risk:** The failure to supply agreed contracts could seriously jeopardize future sales. Plantation agriculture and contract farming both offer reasonable supply reliability. Sponsors of contract farming, even with the best management, always run the risk that farmers will fail to honour agreements. Companies must ensure that crops are harvested and sold on a carefully scheduled and consistent basis (FAO, 2001).

4. **Quality consistency**: Markets for fresh and processed agricultural produce require consistent quality standards. Moreover, these markets are moving increasingly to a situation where the supplier must also conform to regulatory controls regarding production techniques, particularly the use of pesticides. For fresh produce there is an growing requirement for "traceability", i.e. suppliers to major markets increasingly need to be confident of identifying the source of production if problems related to food safety arises (Byres, 1983)

2.4 Problems of Contract Farming

Early literature such as Cheung, (1969) and Glover,et'al., (1994) focuses on the how contract farming could induce risk-sharing and improve efficiency. The risk-sharing argument states that, under contract farming, both producers and processors receive a predetermined price rather than fluctuating spot market price. Consequently, both parties may find contract farming plausible because of the risk mitigation. As introduced earlier, risk is an important element that may induce contract farming Katchova and Miranda (2004) find that highly leveraged (more risky) crop producers are more likely to adopt marketing contracts and that marketing contracts were used not only to reduce price risk but also to have an outlet for the harvested crop.

Processed sorghum and millet products are still cheaper than maize and rice products. However, to remain competitive the demand for processed coarse grains must increase. (Jupiter, and Nelson, 2012)

2.4.1 Problems faced by farmers

1. **Increased risk**: Farmers entering new contract farming ventures should be prepared to balance the prospect of higher returns with the possibility of greater risk. Such risk is more likely when the agribusiness venture is introducing a new crop to the area. There may be production risks, particularly where prior field tests are inadequate, resulting in lower-than-expected yields for the farmers. Market risks may occur when the company's forecasts of market size or price levels are not accurate. Considerable problems can result if farmers perceive that the company is unwilling to share any of the risk, even if partly responsible for the losses. In Thailand, for example, a company that contracted farmers to rear chickens charged a levy on farmers' incomes in order to offset the possibility of a high chicken mortality rate. This was much resented by the farmers, as they believed that the poor quality of the day-old chicks supplied by the company was one reason for the problem.

2. **Unsuitable technology and crop incompatibility:** The introduction of a new crop to be grown under conditions rigorously controlled by the sponsor can cause disruption to the existing farming system. For example, the managers may identify land traditionally reserved for food crops as the most suitable for the contracted crop. Harvesting of the contracted crop may fall at the same time as the harvesting of food crops, thus causing competition for scarce

labour resources. Particular problems may be experienced when contract farming is related to resettlement programmes. Field extension services must always ensure that the contracted crop fits in with the farmer's total cropping regime, particularly in the areas of pest control and field rotation practices.

3. **Manipulation of quotas and quality specifications:** Inefficient management can lead to production exceeding original targets. For example, failures of field staff to measure fields following transplanting can result in gross overplanting. Sponsors may have unrealistic expectations of the market for their product or the market may collapse unexpectedly owing to transport problems, civil unrest, change in government policy or the arrival of a competitor.(Jupiter and Nelson 2012) All contract farming ventures should have forums where farmers can raise concerns and grievances relating to such issues.

4. **Corruption:** Problems occur when staff responsible for issuing contracts and buying crops exploits their position. Such practices result in a collapse of trust and communication between the contracted parties and soon undermine any contract. Management needs to ensure that corruption in any form does not occur. On a larger scale, the sponsors can themselves be dishonest or corrupt. (Burchy, *et al* 1992)

5. **Indebtedness and overreliance on advances**: One of the major attractions of contract farming for farmers is the availability of credit provided either directly by the company or through a third party. However, farmers can face

considerable indebtedness if they are confronted with production problems, if the company provides poor technical advice, if there are significant changes in market conditions, or if the company fails to honour the contract. This is of particular concern with long-term investments, either for tree crops or for on-farm processing facilities. If advances are uncontrolled, the indebtedness of farmers can increase to uneconomic levels. In one venture "compassionate" advances for school fees, weddings and even alimony resulted in many farmers receiving no payments at the end of the season. Dropout rates for farmers in that particular project were high, as they thought contract farming did not pay. (Eaton, and Charles, 2001)

2.4.2 Problems faced by sponsors

1. **Land availability constraints**: Farmers must have suitable land on which to cultivate their contracted crops. Problems can arise when farmers have minimal or no security of tenure as there is a danger of the sponsor's investment being wasted as a result of farmer- landlord disputes. Difficulties are also common when sponsors lease land to farmers. Such arrangements normally have eviction clauses included as part of the conditions. Some contract farming ventures are dominated by customary land usage arrangements negotiated by landless farmers with traditional landowners. While such a situation allows the poorest cultivator to take part in contract farming ventures, discrete management measures need to be applied to ensure that landless farmers are not exploited by their landlords (Carney, 1994). Before entering into contracts, the sponsor must ensure that access to land is secured, at least for the term of the agreement**.**

2. **Social and cultural constraints**: Problems can arise when management chooses farmers who are unable to comply with strict timetables and regulations because of social obligations. Promoting agriculture through contracts is also a cultural issue (Clarke *et al 1986*). In communities where custom and tradition play an important role, difficulties may arise when farming innovations are introduced. Before introducing new cropping schedules, sponsors must consider the social attitudes and the traditional farming practices of the community and assess how a new crop could be introduced. Customary beliefs and religious issues are also important factors.

3. **Farmer discontent:** A number of situations can lead to farmer dissatisfaction. Discriminatory buying, late payments, inefficient extension services, poor agronomic advice, unreliable transportation for crops, a mid-season change in pricing or management's rudeness to farmers will all normally generate dissent. If not readily addressed, such circumstances will cause hostility towards the sponsors that may result in farmers withdrawing from projects. This emphasizes the importance of good management to the success of contract farming. (Dunham 1995)

4. **Input diversion:** A frequent problem is that farmers are tempted to use inputs supplied under contract for purposes other than those for which they were intended. They may choose to use the inputs on their other cash and subsistence crops or even to sell them. Clearly this is not acceptable to the sponsor, as the contracted crop's yields will be reduced and the quality

affected. Steps to overcome such problems include improved monitoring by extension staff, farmer training and the issuing of realistic quantities of inputs. However, the knowledge that a contract has the advantages of technical inputs, cash advances and a guaranteed market usually makes the majority of farmers conform to the agreement. Unless a project is very poorly managed, input diversion is usually an annoyance rather a serious problem.

2.5 Cultivation of Sorghum in Nigeria

Sorghum requires an average temperature of at least 25°C to produce maximum grain yields in a given year. Maximum photosynthesis is achieved at daytime temperatures of at least 30°C. Night time temperatures below 13°C for more than a few days can severely reduce the plants' potential grain production. Sorghum cannot be planted until soil temperatures have reached 17°C. The long growing season, usually 90–120 days, causes yields to be severely decreased if plants are not in the ground early enough (FAO 2010). Sorghum, in general, is a very competitive crop, and does well in competition with weeds in narrow rows. Sorghum produces a chemical compound called sorgoleone, which the plant uses to combat weeds. The chemical is so effective in preventing the growth of weeds it sometime prohibits the growth of other crops harvested on the same field. To address this problem, researchers at the Agricultural Research Service found two gene sequences believed to be responsible for the enzymes that secrete the chemical compound sorogoleone (USDA 2010) The discovery of these gene sequences will help researchers one day in developing sorghum varieties that cause less soil toxicity and potentially target gene sequences in other crops to increase their natural pesticide capabilities, as well.

2.6 Economic Importance of Sorghum

Sorghum is a cereal crop grown for food, feed and industrial uses. Sorghum is the 5th most important cereal in the world in terms of both production and area planted. Almost 90% of the world's sorghum is produced in the developing countries of Africa and Asia; particularly in areas with low rainfall and incessant drought. Nigeria is the second largest producer of sorghum in the world, with an annual production in excess of 8 million metric tons. Most households produce sorghum to meet the household requirements and only a small proportion of the harvest is traded, mostly on local markets. Sorghum is fast becoming a very important commodity in the food and beverage industries; the industrial demand for sorghum in Nigeria is estimated to be about 200,000 metric tons. Sorghum stalks are used as feed, fuel and in construction - thatching and roofing of houses. Increased sorghum production will translate directly into higher consumption, better nutrition and enhanced trading for maximum benefits. The leaves and grain of sorghum are use for livestock feeds and stalks for thatching houses and making fences. Sorghum is a very valuable industrial crop for brewing alcoholic and non-alcoholic drinks as well as in the baking and confectionary industry (Aduba,*et al,*2013). In Nigeria, according to (NRC, 1996), sorghum has greater untapped potential than any other crop. Sorghum has a unique property that makes it well suited for food uses. Sorghum is one of the most drought tolerant cereal crops currently under cultivation. It offers farmers the ability to reduce costs on irrigation and other on-farm expenses. Sorghum requires an average temperature of at least 250c to produce maximum yield. In general, is a very competitive crop and does well in competing with weeds in narrow rows (FAOSTAT, 2010). Sorghum is known as a high-energy, drought tolerant crop. Because of its wide uses and adaptation "sorghum

is one of the really indispensable crops" required for the survival of humankind (Jack, 1971).

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

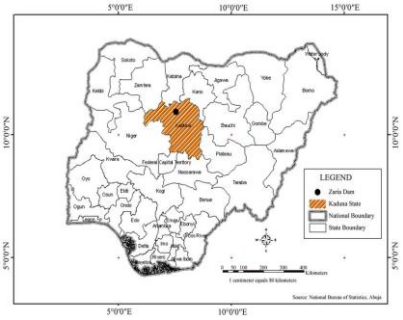
This study was carried out in Kaduna State, Nigeria. Kaduna state is located betweenLongitudes 6^0E and 9^0E and Latitudes 9^0N and 12^0N and of the prime meridian. It shares common borders with Abuja in the South – East and six other States namely, Katsina, Kano, Zamfara in the North-North, Nasarawa, Plateau in the North-East, Niger in the North-West. The climate varies from North to South of the state. The vegetation in the state is divided into Northern Guinea Savanna in the North and Southern Guinea Savanna in the South. The state has a population of 6,066,252 people according to 2006 census (FOS, 2006). Kaduna state is one of major producers of sorghum with annual production of 606,000 metric tonnes respectively (Ministry of commerce, Industry and Tourism, 2000). Kaduna State has twenty three (23) local government areas, out of which three local government areas was purposely selected for this study. These include Giwa, Ikara and Makarfi. They are purposely selected because they are among the most industrialized local government areas in the state,

they contribute significantly to the nation's Sorghum output (Farauta,*et al.,* 2011) and also preliminary study shows that they have highest number of contract farmers.

Giwa local government area of Kaduna state is located in the northern guinea savannah and on the plains of northern Kaduna. It lies between latitude 11.20 – 11.52°N and longitude 7.0-7.5°E. It has an area of 2,066 km² and a population of 286,427 at the 2006 census. Markafi lies between $11^{0}22$'N, $7^{0}52$E has an area of 541 km² and a population of 146,259 at the 2006 census. Ikara is located some 30 kilometres north-east of the city of Zaria, Kaduna North, its headquarters are in the town of Doka. It has an area of 72 km² and a population of 357,694 at the 2006 census. The area is characterized by alternating dry and wet season with a mean annual rainfall that varies from 1,000mm to 1,300mm and temperature of between 27 and 32°C. The major source of livelihood in this area is farming, engaging about 70% of the rural population. Farming is traditional in nature with emphasis on the cultivation of crops such as sorghum, maize, millet, groundnuts and cowpeas and keeping of livestock.



Map of Kaduna States Showing Selected LGAs for the Study



Map of Nigeria showing Kaduna State

3.2 Sampling Procedure

Multistage sampling procedure was employed for this study. In the first stage, 3 Local Government Areas were purposely selected; Giwa, Markafi, and Ikara because of the predominance in sorghum production and firm's contract supplies. There are 15, 18 and 16 villages in Giwa, Makarfi and Ikara Local Government Area respectively (USAID/MARKETS, 2010). In the second stage, 4 villages were purposely selected from each Local Government Areas based on their intensity in sorghum production under contract farming. There are 172, 140 and 70 sorghum contract farmers in Giwa, Markafi and Ikara Local Government Areas respectively. In the third stage, a random selection of 50% of the contract farmers was made as shown in Table 3.1

Table 3.1: Population and sample size of contract farmers

LGAs	**Villages**	***Sample frame**	**Sample size (50%)**
Giwa	4	172	86
Markafi	4	140	70
Ikara	4	70	35
Total	12	382	191

***USAID/MARKETS (2010)

3.3 Method of Data Collection

Primary Data were used for the study. Primary data such as socio economics characteristics (age, household size, educational status, number of contacts with extension agents,), input-output data such as quantity of seeds, farm size, were obtained through a well-structured questionnaire that was administered to the respondents. Data collected include information on socioeconomic characteristics, contract attributes and preferences and constraints

3.4 Analytical Techniques

3.4.1 The descriptive statistics

The simple descriptive statistics such as frequency distribution and percentages were used to achieve objectives i, ii, iii and v.

3.4.2 Multinomial logit regression model

The multinomial logit was used to achieve objective iv, factors that determine preference for contract attributes. The multinomial logit model (MNLM) is used for analyzing unordered qualitative variables. It deals with truly nominal and mutually exclusive categories. Suppose a dependent variable (Y) has an m category that is Y = 1, 2 …m with P_1, P_2…Pm as associated probabilities, such that $P_1+P_2+\ldots+P_m = 1$. The usual thing is to designate one as the reference category. The probability of membership in other categories is then compared to the probability of membership in the reference category. Consequently, for a Y with 'm' categories, this requires the calculation of m-1 equations, one for each category relative to the reference category, to describe the relationship between the Yand the independent variables (X_s). The choice of the reference category is arbitrary but should be theoretically motivated. The generalized form of probabilities for an outcome variable with M categories is:

$$\Pr(Y_i = m1X_i) = P_{im}\frac{\exp(x_i\beta_m)}{1+\sum_{m=2}^{m}\exp(X_i\beta_m)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

For m > 1

$$\Pr(Yi = i1Xi) = P_m = \frac{1}{\sum_{m=2}^{m}\exp(X_i\beta_m)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

For K covariates, a total of (K+1) * (M-1)

Parameters will be estimated

The odds and odds-ratios for a variable with M categories and baseline, M=1:

The MNLM is built on the independence of irrelevant alternatives (IIAs) assumptions. The Hausman-McFadden is used for the tests of IIA. The procedure is to first estimate the full model with m outcomes. Then, a restricted model is estimated by eliminating one or more m. The test of the difference between the two, which is asymptotically distributed as chi-square with degrees of freedom equal to the rows in restricted model if IIA, is true. Significant χ^2 values indicate violation of the assumption that the difference between the two models is not equal to zero (Ojiako et al., 2009).

Empirical model

The empirical multinomial logit model for this study is specified as:

$Y\,i = f\,(X1, X\,2,...,X9)$

Where Yi, the dependent variable is polychotomous and it is defined as the farmers' choice of the attributes; Xi are the explanatory variables. The dependent variable (Yi) is measured as 1 for location of delivery, 2 for packaging size, 3 for price setting, 4 for mode of payment, 5 for quality of grain and 6 for dispute resolution (in case of misunderstanding between contract sorghum producers and industrial buyers). The explicit form is thus given as:

$$Y = \beta_0 + \beta_1 X_1 i + \beta_2 X_2 i + \beta_3 X_3 i + \beta_4 X_4 i + \beta_5 X_5 i + \beta_6 X_6 i + \beta_7 X_7 i + \beta_8 X_8 i + e$$

Where;

Y = the choice of contract attributes (numbers of attributes chosen)

β_0 = constant term

β_1- β_9 = regression coefficients

X_1 = age of farmer (years)

X_2 = household size (number)

X_3 = educational status (years)

X_4 =amount of capital received (naira)

X_5=numbers of extension visit (years)

X_6 = farm size (hectares)

X_7 = contract farming experience (years)

X_8 = labour availability (man-days)

3.5 Variable Definitions and Measurement

Eight explanatory variables was measured as continuous and discrete variables was hypothesized for determinants of Farmer's contract preference.

X_1:Age: This refers to the number of years of an individual attained from birth. Age is expected to have positive impact on the farmer's contract preferences.

X_2: Household size: This means the total number of people in the house which includes include the wives, children and dependents that reside within the same house. The total number of people in the household is expected to have a positive impact on the farmer's contract preferences as it will affect the amount of labour availability.

X_3: Educational status: This refers to the acquisition of knowledge through formal schooling and informal schooling such as Arabic school, adult education. This was measured by the number of years spent in school.

X_4: Amount of capital received: This refers to amount of money received from both sponsors and individual sources. It was measured as the actual money/credit utilized in production. The amount of money/credit borrowed is expected to have a positive impact on the farmer's contract preferences.

X_5: Numbers of extension contact: This refers to the access to government extension services by the respondents in a production cycle. It was measured in numbers of visits.

X_6: Farm Size: It is included in the model to determine the extent to which variability in the choice of contract attributes is affected by farm size. It was measured in hectares. The farm size available for production is expected to have a positive impact on farmer's contract preference.

X_7: Farming Experience: It is included in the model to examine how the choice of contract attributes is affected by years of farming experience. Farming experience is expected to have a positive impact on farmer's contract preference.

X_8: Labour Availability: This consist of family and hired labour, it was measured in man-days.Labour is expected to have a positive impact on the farmer's contract preference.

3.6 Definition of Contract Attributes

Attribute 1: Location of delivery associates to transport cost sharing and their integration into the price formulation. The magnitude of transport costs varies with the distance between the locations of producers and processors and with the quality of road and transport infrastructure. Three levels are identified: "producer's place", "processor's place" and "collection point". If producers' place, processors fully bear transport costs, therefore may be willing to pay low prices. If processors' place, producers rather bear full transport costs and will negotiate prices accordingly. In case of a collection point, producers and processors share transport costs equally. The collection point can be a store or a gathering place.

Attribute 2: **Packaging size:** is an important attribute as it links to quantities and packaging costs. Packaging costs get lower with larger pack sizes. Two pack sizes were identified: "100 kg" and "50 kg". Producers whether large or small can deliver both pack sizes.

Attribute 3:Price setting: is critical because it is a major cost component for processors and a major revenue component for producers. Three levels are on the basis of market price: "market price", "10% premium over the market price" and "20% premium over the market price.

Attribute 4: Mode of Payment: Two modes of payment identified: "cash" and "credit". If cash, transaction ends quickly; this favors producers who quickly solve their cash needs, but this requires processors to have working capital or credit available in time to buy the product.

Attribute 5: Quality of Grain incurs potential price/revenue gains or losses according to quality grades and moral hazard issues. Two levels were identified:

“check” and “don’t check”. If the contracts allow processors to check quality before paying for the product, processors will be satisfied and may therefore pay with a premium; however, producers incur the risk that the product can be rejected if it is assumed of low quality. Otherwise, the contract may not be binding on checking quality to create trust between processors and producers; but, with no checking, quality is doubtful and may reward less; with this level of attribute, disputes after sales are possible and reputation can sanction future contracts.

Attribute 6: **Dispute resolution** this entails a special note on the issue of trust. Two modes of dispute resolution were identified: “with a third party” or “without a third party’’.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socioeconomic Characteristics of Sorghum Farmers

4.1.1 Age distribution of sorghum farmers

Table 4.1 revealed that 41% of the sorghum farmers under contract farming were within the age range of 41-50 years. The mean age of sorghum farmers was found to be 43 years with minimum of 21 years and maximum of 67 years. Age is very important in agricultural production activities because age has a significant influence on the decision making process of farmers with respect to adoption of improved farming technologies and other production-related decisions. This implies that, the farmers are strong, agile, and active and can participate adequately in farming activities. This finding is similar to that of Adegboye, (2011) which observed that youth constitute the majority of the sorghum farmers in the study area. This result is also in line with the findings of Abdulrahman, *et al*(2015) which observed that youth constitute the majority of the farming household, and younger farmers are more flexible to new ideas and risk; hence they are expected to adopt innovations more readily than older farmers. On the other hand, older farmers are more experienced on the social and physical environments.

Table 4.1: Age Distribution of Sorghum Farmers

Age (years)	Frequency	Percentage
21-30	19	9.9
31-40	29	15.2
41-50	78	40.8
51-60	48	25.1
61-70	17	8.9
Total	**191**	**100**
Min	**21**	
Max	**67**	
Mean	**43**	
S.E	**0.73**	

4.1.2 Household size of sorghum farmers

Table 4.2 show the distribution of sorghum farmers under contract farming by household size. The majority of the farmers (67%) had household sizes that ranged from 1-10 persons with minimum of 1 person and maximum of 32 persons. The average household size was 9 persons implying that there was a number of family laboursupply to accomplish various farm operations. The significance of household size in agriculture hinges on the fact that the availability of labour for farm production, the total area cultivated to different crop enterprises, the amount of farm produce retained for domestic consumption, and the marketable surplus are all determined by the size of the farm household (Amaza, Joseph and Yakubu, 2009). According to Okoruwa and Ogundele, (2006) large family size does not necessarily

translate to higher use of family labour because some of the young able bodied family member may prefer other jobs than farming. According to the report of Oluwatayo*et al.*, (2008), there is a positive and significant relationship between household size and farmers' efficiency in production. However, the absolute number of people in a certain family cannot be used to justify the potential for productive farm work. This is because it can be affected by some important factors namely; age, sex and health status. Essentially, it is the composition of the household that determine labour supply for the accomplishment of farm operations.

Table 4.2: Households distribution of sorghum farmers

Household	**Frequency**	**Percentage**
1-10	128	67.0
11-20	51	26.7
21-30	8	4.2
31-40	4	2.1
Total	**191**	**100**
Min	**1**	
Max	**32**	
Mean	**9**	
S.E	**0.54**	

4.1.3 Educational level of sorghum farmers

Table 4.3 show that 59% of sorghum farmers under contract farming had no formal education. They had koranic education as a result of great influence of Muslim in the

Study Area. This indicated that the farmers' educational level influences farmers' decision making because of its influence on farmers' awareness, perception and adoption of innovations that can bring about increase in productivity. This finding is in line with Amaza (2000), who found that education has a positive and significant impact on farmers' efficiency in production. Thus, farmers' education is believed to influence the use of improved technology in agriculture and, hence, farm productivity. They also maintained that education is highly important for sustainable agricultural growth and development. The result implied that extension packages on new technological innovations can impact positively on sorghum farmers if proper awareness is given to them.

Table 4.3: Educational level of sorghum farmers

Educational level	**Frequency**	**Percentage**
No formal education	113	59.2
Primary education	46	24.1
Secondary education	29	15.2
Tertiary education	3	1.5
Total	191	100

4.1.4 Amount of credit obtained by sorghum farmers under contract farming

Table 4.4 show that 61% of sorghum farmers under contract farming financed their sorghum production from personal savings while 46% of the farmers had access to credit from the contract.The low access to formal credit was probably due to high default rates leading to low level of trust in borrowers. Such low confidence already

depicted a risky environment for contracts. Ekong, (2003) asserted that credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity.

Table 4.4: Amount of credit obtained by sorghum farmers under contract farming

Credit(₦)	**Frequency**	**Percentage**
No access to credit	117	61.3
≤ -100,000	50	26.2
100,001-200,000	12	6.3
200,0001-300,000	9	4.7
>300,000	3	1.6
Total	191	100
Min	40,000	
Max	500,000	
Mean	65,000	
S.E	6279.27	

4.1.5 Numbers of extension contact by sorghum farmers under contract farming

The ultimate aim of extension contacts is to enhance farmers' ability to efficiently utilize resources through the adoption of new and improved methods used in sorghum production instead of using traditional methods which are inefficient, resulting to low yield. The distribution of the sampled farmers based on numbers of extension visit is presented in Table 4.5.

The study revealed that 74% of the sorghum farmers under contract farming in the study area had only one extension contact, while about 8% had more than one in a year. The maximum extension contacts observed was 22 times with minimum of zero and an average of 2 times per year. This implies that there was appreciable number of extension services in the study area. Extension services enhance sorghum farmers'

ability to efficiently utilize resources through the adoption of new and improved methods used in sorghum production in the study area. According to Obwona, (2000), extension contact is very essential to the improvement of farm productivity and efficiency among farmers. Umar, Ndanitsa, and Olaleye, (2009) argued that higher extension contacts would increase adoption of improved farm production technologies. They further argued that the frequency of extension contact is very essential as it guides the farmers from awareness to the adoption stage.

Table 4.5: Extension contact of sorghum farmers under contract farming

Extension	**Frequency**	**Percentage**
1	142	74.3
2-10	32	16.8
11-20	15	7.9
>21	2	1.0
Total	191	100
Min	0	
Max	22	
Mean	2	
S.E	0.47	

4.1.6 Membership of cooperative society

Table 4.6 show the number of years spent as members of cooperative association. 53.9% of sorghum farmers did not participate in any cooperative association while 46.1% participated with average of 5years. Therefore many of the sorghum farmers in

the study area did not enjoy the assumed benefits accrued to co-operative societies through pooling of resources together for a better expansion, efficiency and effective management of resources and for profit maximization. Ekong, (2003) observed that membership of cooperative societies has advantages of accessibility to micro-credit, input subsidy and also as avenue in cross breeding ideas and information.

Table 4.6: Distribution of sorghum farmers on membership of cooperative society

Cooperative	**Frequency**	**Percentage**
Non member	103	53.9
1-10	62	32.4
11-20	21	6.3
>20	5	2.6
Total	191	100
Min	0	
Max	35	
Mean	5	
S.E	0.51	

4.1.7 Farming experience among sorghum farmers

Farmers' distribution by their farming experience as presented in Table 4.7 show that 36% of sorghum farmers had between 11-20 years of farming experience while about 4% were within 1year experience. The average farming experience for sorghum production is 18 years. Farming experience of a farmer determines his ability to make

effective farm management decisions, not only adhering to agronomic practices but also with respect to input combination or resource allocation. Farming experience was expected to influence farm production efficiencies because of accumulation of skills. Adebayo (2006) noted that the longer a person stays on a particular job, the better his job performance tends to be. The result suggests that job performance in sorghum production would be better under long years of experience.

Table 4.7: Farming experience distribution of sorghum farmers

Experience	**Frequency**	**Percentage**
0-1	7	3.7
1-10	70	36.6
11-20	54	28.3
21-30	39	20.4
31-40	21	11.0
Total	191	100
Min	0	
Max	40	
Mean	18	
S.E	0.84	

4.1.8 Farm size Distribution of sorghum farmers

The results in Table 4.8 revealed 87% of sorghum farmers had farm sizesthat range from <1-3 hectares while less than 4% had farm size greater than 7. The mean farm size was 3 hectares. This show that majority of the farmers have small farm sizes and

were not able to enjoy economy of scale in production. Small farm sizes might be as a result of the fact that most of the farmers got their land through inheritance. The implication of this finding is that sorghum farmers are predominantly small-scale farmers. These results also agreed with Ojuekaiye's, (2001) classification of farms between 0.1 hectares and 5.9 hectares as small-scale.

Table 4.8: Farm Size Distribution of Sorghum Farmers

Farm Size	**Frequency**	**Percentage**
≤1-3	166	86.9
4-6	18	9.4
7-9	4	2.1
>10	3	1.6
Total	191	100
Min	1	
Max	12	
Mean	3	
S.E	0.22	

4.2 Contract Attributes Preferred by Sorghum Producers

Distribution of sorghum producers for contract attributes was presented in Table 4.9 to give contract sorghum characteristics before explaining their preference for contract attributes

4.2.1 Distribution of Sorghum Producers Preference Characteristics

The result presented in Table 4.9 revealed the distribution of sorghum Producers contact attributes. Following the six (6) contract attributes identified in the study area; it is estimated that 80% of producerssold their harvests on farm and 15.7% preferred the market while 4.7% of producers preferred to found buyers at collection points. This implies that location of delivery was associated with a positive effect on farmers' choices among alternative market outlets. Since transport costs varied with the distance between the locations of producers and processors and with the quality of road and transport infrastructure. An outlet market with promising relative higher price will influence farmer's choice on location of delivery of its output because output price is an incentive for farm households to supply more produce for sale which subsequently result in higher income.

In terms of packaging size, 73% of sorghum producers used 100 kg bags and 19.9% used 50 Kg while 6.5% of sorghum producers preferred using 25 Kg bags. This implies that packaging size is an important attribute as it links to quantities and packaging costs. Packaging costs get lower with larger pack sizes.

In terms of price levels, 94% of the respondent sold at market price while 6.3% of the producers opted for market price plus premium for 20% of the produce. The latter might be the case of those staying on their current alternative or willing to accept contracting to keep high prices. Price setting is critical because it is a major cost component for processors and a major revenue component for producers.

Cash transaction was dominant for majority of producers (99%). This method favours producers who can quickly solve their cash needs.However, this requires processors to have working capital or credit available in time to buy the product. While quality

was systematically checked at sale (91.1%). 96.9% of producers resolved contract disputes through a third party while 3.1% requiring no third party.

Table 4.9: Distribution of sorghum producers by their preference for contact attributes

Attributes	Frequency	Percentage
Location of delivery		
Producers place	152	79.6
Collection point	9	4.7
Market	30	15.7
Packaging size		
25kg	13	6.8
50kg	38	19.9
100kg	140	73.3
Price setting		
Market price	179	93.7
Market price + premium	12	6.3
Mode of payment		
Cash	189	98.9
Credit	2	1.1
Quality of grain		
Checked	174	91.1
Not checked	17	8.9
Dispute resolution		
With third party	185	96.9
No third party	6	3.1
Total	191	100

4.2.2 Contract Attributes Preferred by Sorghum Producers

The result presented in Table 4.10 revealed sorghum producer preferences for contract attributes by terms of pref. 1, pref. 2,pref. 4, and pref. 6. The results in Table 4.10

suggest that, producers generally preferred the following four levels of attributes: “packaging size of 100 kg”, “cash payment”, “market price” and “dispute resolution with a third party”. There were some divergences regarding the preferences for “Location of delivery” and “Quality checking”.

The result presented in Table 4.10 showthat all the sorghum farmers opted for Producers place. producers delivery at market's place and collection point were relatively more represented among producers accepting contracts, location of delivery in the reference alternative did not differentiate the groups of preference for contracts. This finding is in line with Hudson and Lusk (2004); Roe *et al*. (2004); Furesi, *et al*. (2006); Blandon,*et al*. (2009); Schipmann and Qaim, (2011) and Wendler, *et al*. (2012). They opined that location of delivery is the drivers of the preference of contracts to spot market or other marketing arrangements.

Table 4.10 showed that producers liked Packaging grains in 100 Kg bags. All of attribute 2 and 4 and 80% of attribute 6 of sorghum farmers preferred 100 kg bags compared to 25 and 50 kg bags. This is because Packaging costs get lower with larger pack sizes with Producers and can supply conveniently. It is also an important attribute as it links to quantities and packaging costs even though industrial buyers were indifferent towards packaging size.

Producers selling in the spot market at market price were relatively more represented among producers. Producers who received premium prices relatively opted for contracts to maintain higher price levels. Price setting was critical because it is a major revenue component for producers. Credit-constrained producers preferred to deliver raw materials at collection points and market’s places, in contrast to less credit-constrained producers. At the opposite, less credit-constrained producers were

those seeking prices above market levels because they had some bargaining power accruing from not being locked-in by trade credits. According to Prowse (2012) associates successful contracts with those fixing *ex ante* quality grades and prices higher than probable spot prices, which therefore are subject to substantial side-selling by farmers if market prices rise significantly and require an enforcement mechanism.

About 92% of sorghum producers in attribute 1 preferred that quality of grain should be systematically checked at sale while 100% in attributes 2 did not allow checking of grain quality at sale. Cash transaction was dominant for producers and were relatively more represented among producers than credit. Producers resolved contract disputes through a third party. Surprisingly, the prevailing and preferred third party for dispute resolution was not the Police, but either the apex body of farmer's organizations or commodity exchange agents. Due to lack of confidence in the formal enforcement system were not found trusting Police-based settlement of disputes.

Table 4.10: Contract attributes preferred by sorghum producers

Attributes	Level of attributes	Pref. 1	Pref. 2	Pref. 4	Pref. 6
Location of delivery	Producers place	----	100%	---	---
	Collection point	92%	-----	56%	---
	Market	50%	-----	----	64%
Packaging size	25kg	20%	----	----	----
	50kg	80%	----	-----	90%
	100kg	__	100%	100%	80%
Price setting	Market price + 10% premium	90%	-----	70%	100%
	Market price + premium 20%	10%	94%	-----	-----
Quality of grain	Checked	92%	-----	----	---
	Not checked	----	100%	---	---
Mode of payment	Cash	100%	----	96%	100%
	Credit	-----	18%	20%	100%
Dispute resolution	With third party	98%	100%	------	100%
	No third party	----	----	50%	-----

4.3 Determinants of Farmers' Preference for Contract Attributes

The multinomial logit model was used to estimate the parameters of farmers' preference for contract attributes in Kaduna State. The Pseudo R-squared value (0.52) indicated that 52 percent of the variation in the farmers' preference of contract attributes of sorghum farmers was explained by the independent variables included the model. The chi-square value of 52% indicates that the explanatory variables jointly influence the farmers' preference of contract attributes (Table 4.11). Farmers' preference of contract attributes is significantly determined by location of delivery, packaging size, price setting and dispute resolution. This implies that producers place,

market price and dispute resolution with third party were the most influential determinant of farmers' preference of contract attributes in the study area.

The results presented in Table 4.11 show that location of delivery significantly influence the preference of contract attributes by sorghum farmers in the study area. This is because farmers will like to maximize his profit through reduction in transportation cost. The positive signswill lead to an increase in the odds in favour of the farmers choosing location of delivery due to its cost implication. The result is consistent with the finding of Nzomoi, *et al.,* (2007) who opined that distance to market significantly influence choice of an individual farmers/marketers in terms of transportation of produce to available market outlet.

Market price hada positive influence on farmers' preference of contract attributes. A unit increase in the market price of sorghum results in an increase in the probability of preference of contract attributes by 0.06. According to economic theory, market price is an incentive for farm households to supply more produce for sale which subsequently result in higher income. Studies by Olwande, *et al*. (2010), Enete, and Igbokwe, (2009) and Omiti, *etal*. (2009) support thistheory. A major challenge of the farmer is to produce to meet the demands of the market. Higher market price guarantees the income of the household head. In order to take advantage of the market price, household heads may choose from alternative market based on higher market price.

Dispute resolution with third partyhad a positive and significant effect on farmers' preference of contract attributes. Producers preferred the presence of a third party to resolve disputes because they feared that weighing measurement tools and the

checking of other grain quality attributes would be faked.This could be explained by the low level of trust among the value chain actors, the lack of good enforcement mechanisms and the risks of moral hazard.

Table 4.11: Multinomial logit model estimates of farmers' preference of contract attributes of sorghum farmers.

Variable	**Coefficient**	**Standard error**	**T-value**	**Marginal effect**
Constant	-19.625	11.376	-1.725*	0.083
Location of delivery	0.151	0.059	2.559***	0.066
Packaging size	0.319D-05	0.538D-05	0.378	0.705
Price setting	0.0045	0.0024	1.875*	0.063
Mode of payment	-0.644	0.6531	-0.819	0.413
Dispute resolution	0.549D-05	0.224D-05	2.851***	0.031
Numbers of observation		191		
Log likelihood function		-113.401		
Restricted log likelihood		-117.128		
McFadden Pseudo R-square		0.52		
Chi-square χ^2		7.25		
DF		7		
Prob (chi-square > value)		0.531		

***p<0.001**p < 0.05 and *p < 0.10

4.4 Constraints Faced by Sorghum Contract Farmers

The constraints faced by sorghum contract farmers were ranked according to their magnitude (Table 4.12). High cost of fertilizer ranked first with 95.8% of the respondents indicating it as one of their major constraint. According to the respondents, fertilizer is not made available to farmers in good time, until far into planting. About 91% of the respondents indicated inadequate capital to finance

agricultural activities. This affect sorghum production in the study area as the new contract terms introduced by the contractor is labour intensive, demanding adequate cash to pay for labour and buy inputs. The farmers also complained that even when they desire to allocate more land to sorghum production, they are cash trapped, because their meager savings from off farm activities cannot meet their needs during the farming season.

High cost of labour (85%) of the sorghum farmer indicatedthis as constraints in the study area. According to the farmers, during peak period of production-every household would have been engaged in his family farm work. The demand for labour is normally very high and expensive during the peak period of land clearing, ridging, planting,weeding, harvesting and processing in the study area.

About 52% of the respondents indicated late commencement of pre-season training by the contractor as a constraint. This is because some of them was far into planting before pre-season training started while 35.1% of sorghum farmers indicated security as the least constraint to contract farming.

Table 4.14: Constraints being faced by sorghum contract farmers.

Constraints	***Frequency**	**Percentage**	**Ranking**
High cost of fertilizer	183	95.8	1st
Inadequate capital	174	91.1	2nd
High cost of labour	162	84.8	3rd
Late commencement of pre-season training	98	51.6	4th
Security	67	35.1	5th

* Multiple responses were allowed.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study focused on an analysis of contract and contract attributes among sorghum producers in Kaduna State, Nigeria. Three Local government Area were purposely selected from Kaduna State, Four villages were randomly selected from the three Local Government Area and 191 farmers were randomly selected from the Twelve villages.

The primary data were collected using a structured questionnaire. The statistical tools used to analyze the data were descriptive statistics and multinomial logit regression analysis.

The result of the study show that 41% of the respondents were 43years old, the household size was an average of 9 persons with 67%, the majority of the farmers (59%) did have formal education. 61% do not have access to credit. 74% had access to extension service only once, (54%) were not members of a cooperative society. 36% had farming experience between 11-20 years while 87% of the farmers have a land size between 1-3 hectares.

The result revealed the distribution of sorghum Producers by their preference characteristics. About 80% of the sample of producers selected the preference alternative. Following the six (6) contract attributes identified in the study area; it is estimated that 80% of producers sold the harvests at their place and 16% at the market while 5% of producers found buyers at collection points. In terms of packaging size, 73% of sorghum producers used 100 kg bags and 20% using 50 Kg while 7% of sorghum producers used 25 Kg bags. In terms of price levels, 94% of the respondent

indicate market price while 6% of the producers opted for market price plus premium for 20% of the sample. Cash transaction was dominant for producers (99%). While quality was systematically checked at sale (91%). 97% of producers resolved contract disputes through a third party while 3% requiring no third party.

The result also shows that producers generally preferred the following four levels of attributes: “packaging size of 100 kg”, “cash payment”, “market price” and “dispute resolution with a third party”. There were some divergences regarding the preferences for “Location of delivery” and “Quality checking”.

The multinomial logit model was used to estimate the parameters of the preference of contract attributes in Kaduna State. The Pseudo R-squared value indicates that 53 percent of the variation in the farmers’ preference of contract attributes of sorghum farmers is explained by the independent variables. The significant chi-square value of 53% indicates that the explanatory variables jointly influence the farmers’ preference of contract attributes. Farmers’ preference of contract attributes is significantly determined location of delivery, packaging size, price setting, mode of payment and dispute resolution. Numerically and statistically, producers place, market price and dispute resolution with third party were the most influential determinant of farmers’ preference of contract attributes in the study area.

The major constraints identified on sorghum contract farmers in the study area were high cost of fertilizer (96%), inadequate capital (91%), high cost of labour (85%), late commencement of preseason training (52%) and security (35%).

5.2 Conclusion

In conclusion, for sustainable contract design for sorghum producers in Kaduna State, it is important to include among others, 4 important traits namely packaging size (100 Kg packaging), transaction in cash (cash payment), quality standard be met (quality checking) and a third party should settle the disputes (if any). Additionally, producers willing to contract with industrial buyers should accept the location of delivery preferred by industrial buyers and integrate transport costs into price formulation. .

5.3 Recommendations

i. In order to facilitate the linkages between value chain actors through contracts, the policy and institutional environment have to be set right in order to induce the right behaviors between actors. Producers need to access loans in the form of inputs to increase the supply of consistent quality grains to industrial buyers. In all the cases, there is a need for crop insurance, especially in the Northern Region where crop production is risky leading to high price variability. Less risky production and non-credit-constrained processing are factors for contracting.

ii. Better institutional and legal environment is also required to reduce taking advantage by contracting parties during the course of the contracts and contract failures. Formal contract enforcement through the Police is not preferred by most value chain actors. Innovative mechanisms to enforce contracts should therefore be devised mimicking informal mechanisms like village heads.

iii. Since price setting significantly influences sorghum farmer's preference for contact. It is recommended that sorghum farmers should be price sensitive, since price setting is a critical contract attributes.

iv. High cost of fertilizer is a serious constraint to contract sorghum farmers, therefore timely and adequate supply of fertilizer should be made available to farmers at affordable price in order to enhance the production of this crop.

5.4 Contribution of the Study to Knowledge

1. The Study revealed that 99% of the sorghum contract farmers prefers cash transaction. This will enable them to meet their immediate needs and prepare for the next planting season.

2. The Study show that 61% of the sorghum contract farmers had no access to credit, which reveals the constraint faced by majority(91%) of them to be inadequate capital.

3. Additionally, the study revealed that 73% of contract sorghum farmers' prefers 100kg packaging size because it is more cost effective and convenient, though the industrial buyers are indifferent in terms of packaging size.

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QUESTIONNAIRE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY,FACULTY OF AGRICULTURE, AHMADU BELLO UNIVERSITY, ZARIA.

RESEARCHQUESTIONNAIRE FOR CONTRACT FARMERS

Dear Respondent,

This questionnaire will be used by a student of the Department of Agricultural Economics and Rural sociology, Ahmadu Bello University, Zaria. Please, fill as appropriate. All information will be treated with confidentiality and strictly for the purpose of research. Thanks for your co-operation.

Village/Community……L.G.A…….....

SOCIO–ECONOMICS CHARACTERISTICS

1. Name of farmer……

2. Gender: Male ( ) Female ( )

3. Age (years)……

4. Marital status: Married ( ) Single ( )

5. Highest level of Education:

(a) No Formal Education ( ) (b) Primary school Education ( ) (c) Secondary School Education ( ) (d) Tertiary Education ( )

6. Family Size (All the number of the people depending on you for living)…….

(a) No of Adult Male ( ) (b) No of Adult female ( ) (c) Children >15yrs ( ) (d) Children <15yrs ( )

7. How long have you been in sorghum farming? (Years of experience)……

8. Do you belong to any co-operative/Association? Yes ( ) No ( )

9. If yes, (Years of participation) ----------

10. What benefit did you derive as a member?.....

11. What is your major source of capital for sorghum farming?

12. If you borrow, what were the sources of the credit and the amount borrowed?

SOURCE OF LOAN	AMOUNT(₦)	INTERST RATE (%)
Commercial Bank		
Nigeria agricultural Cooperative And Rural Development Bank		
Cooperative Societies		
Money Lenders		
Friends And Family		
Others (Specify)		

13. Have you been visited by an extension agent in the last one year? Yes ( ) No ( )

14. If Yes, How many times in last one year?.....

15. Did you visit an extension agent last year? Yes ( ) No ( )

16. If Yes, How many times in last one year?.....

17. What activities did the agent teach you? .....

Activities/Technology	Benefit
Fertilizer application	a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
Intercropping	a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
Plant Spacing	a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
Pest Control	a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )

18. Have you been trained on sorghum farming? Yes ( ) No ( )

19. If Yes, what activities, which organization conducted the training and what benefit did you derived from the training?.....

Activities/Technology	Organization	Benefit
Fertilizer application		a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
Intercropping		a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
Plant Spacing		a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )
ZQ] Pest Control		a. Not beneficial ( ) b. somehow beneficial ( ) c. beneficial ( ) d. very beneficial ( )

20. Of what benefit were the techniques learnt to you to the success of your farm apart from the one listed on the table above?

    .....

21. Please read the following preference term and thick

Preference 1

In this contract, the conditions of sale/purchase state that the products will be delivered at the processors place. Packaging size will be 50kg. Price will be set at the level of market price plus 20%. Mode of payment will be cash. It is decided that quality (level of impurities, etc.) does not need to be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Preference 2

In this contract, the conditions of sale/purchase state that the products will be delivered at the producers' place. Packaging size will be 100kg. Price will be set at

the level of market price plus 20%. Mode of payment will be on credit on terms specified by mutual agreement. It is decided that quality (level of impurities, etc.) does not need to be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Preference 3

In this contract, the conditions of sale/purchase state that the products will be delivered at the producers' place. Packaging size will be 100kg. Price will be set at the level of market price plus 10%. Mode of payment will be on credit on terms specified by mutual agreement. It is decided that quality (level of impurities, etc.) will be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Preference 4

In this contract, the conditions of sale/purchase state that the products will be delivered at the producers' place. Packaging size will be 50kg. Price will be set at the level of market price. Mode of payment will be on credit on terms specified by mutual agreement. It is decided that quality (level of impurities, etc.) will be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Preference 5

In this contract, the conditions of sale/purchase state that the products will be delivered at the processors' place. Packaging size will be 100kg. Price will be set at the level of market price. Mode of payment will be on credit on terms specified by

mutual agreement. It is decided that quality (level of impurities, etc.) does not need to be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Preference 6

In this contract, the conditions of sale/purchase state that the products will be delivered at a collection point. Packaging size will be 100kg. Price will be set at the level of market price. Mode of payment will be cash. It is decided that quality (level of impurities, etc.) does not need to be checked upon delivery of the products. Conflict, if any, will be resolved with a third party.

Attributes	**Level of attributes**	**Pref. 1**	**Pref. 2**	**Pref. 3**	**Pref. 4**	**Pref. 5**	**Pref. 6**
Location of delivery	Producers place						
	Collection point						
	Market						
Packaging size	25kg						
	50kg						
	100kg						
Price setting	Market price + 10% premium						
	Market price + premium 20%						
Quality of grain	Checked						
	Not checked						
Mode of payment	Cash						
	Credit						
Dispute resolution	With third party						
	No third party						

22. State the constraints affecting your sorghum production

i) …….....
(ii) …….....
(iii) …….....
(iv)…….....
(v) …….....

23. What are the coping strategies employed to reduce the problems?

i) …….....
(ii) …….....
(iii) …….....
(iv)…….....
(v) …….....