

**VALUE CHAIN ANALYSIS OF SESAME (*Sesamum indicum* L.) ALONG
JIGAWA – KANO AXIS, NIGERIA**

BY

YA'U NUHU KATANGA

(SPS/10/PAE/00004)

B. Agric (UDUS), M. Sc (ATBU)

**A Thesis submitted to the Department of Agricultural Economics and Extension,
Bayero University, Kano, in partial fulfillment of the requirement for the award
of the Degree of DOCTOR OF PHILOSOPHY in Agricultural Economics**

JUNE, 2016

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The development and business communities involved in the African agriculture and agribusiness sectors have recently experienced a tremendous resurgence of interest in promoting value chains as a way to add value, diversify rural economies, and contribute to increasing rural household incomes in most Sub-Saharan Africa (SSA) countries. Value chains are increasingly recognized as a means to reduce the rural poverty prevalent in the region, (Patrick and Webber, 2010). Nigerian Agricultural export remains dominated by primary commodities, and the share of agriculture in Nigerian export has declined sharply in the last four decades. Despite this trend, agriculture remains one of the major export –revenue source next to crude oil and the largest income generator for its population. It employs over 70% of active population and its contribution to GDP was 9.19% in 2015 (NBS, 2016). Its agricultural production is of low unit value and the result of low-productivity value chains. Nigeria’s agriculture productivity measure of USD 343 value added per worker (2004) is the world’s lowest - world agricultural productivity per worker averages three times that of Nigeria; Latin American productivity per worker averages nearly ten times the Nigerian average (Jean, 2010).

Sesame (*Sesamum indicum* L.) is an oil crop that belongs to the family pedaliaceae and genus *Sesamum* (Purseglove, 1974). The genus consists of about 36

species of which 19 species are indigenous to Africa (Weiss, 1983 and Uzo 1998). It is one of the ancient crops grown for its edible oil by man (Anonymous, 1975; Cobley and Steele, 1979). The crop is known as “Benniseed” in West Africa (Seeglar, 1987). In Nigeria it is known as “*Ridi*” by the Hausas, “*Etuku*” by the Yorubas and “*Isasa*” by the Igbos.

Sesame also called beniseed is believed to have originated from tropical Africa (Nadarabu, 1997). Major producing countries include India, China, Sudan, Uganda and Nigeria; while Japan, U.S.A. and Italy are major importers (Negedu and Habeeb, 2000). Its global production was put at 3.3 million metric tons yearly and is ranked sixth in the world’s production of oil seeds and twelfth in the world’s vegetable oil production, (FAO, 2006). The largest producers are China and India with an estimated annual harvest of 750,000 metric tons each, followed by Myanmar with 425,000 metric tons, Sudan 300,000 metric tons and Nigeria 100,000 metric tons, (USAID, 2009).

Sesame is widely grown in the northern and central zones of the country as one of the major export crops (Ochigbo and Idowu, 2002). Nigeria has a substantial role in the global sesame trade and it is the primary supplier of sesame seed to Japan the world largest importer. The annual export of the commodity in the country is valued at about 20 million U.S. dollars, USAID, (2009). With increasing awareness of its high economic potential as a source of foreign exchange earner, and the demand for sesame and its products both at domestic and international levels, the government of Nigeria, through the Nigerian Export Promotion Council (NEPC), had been encouraging increased production for non-oil exports.

Consequently, preference of Nigeria's sesame in the world market is on the increase because it is free from pesticide (RMRDC, 2004)

The crop is mostly cultivated in the Sudan and Guinea savanna, the Arid and Sahel zones with large portions in Jigawa, Kaduna, Katsina, Taraba, Benue, Kogi, Nasarawa, and Abuja (Philips 1997; Busari *et al.*, 1998). The trend in the production of sesame in Nigeria is increasing annually, considering total production of 44,000 metric tons in 1990 which rose to 69,000 metric tons in 2001 as reported by Kabiru, (1998). While USAID, (2009) gave a recent production figure of 100,000 metric tons annually. Production of the crop started long ago in Jigawa during the period when people went to Mecca by foot through Sudan (JARDA, 1998). Production started gaining prominence from 1994 and since then every year some farmers embrace the cultivation of the crop, with annual production estimate of 7,000 metric tons in 1994 which rose to 45, 000 metric tons in 1997 (Kabiru, 1998). Sesame is an important commercial crop in the state being one of the major crops produce in different locations. Its production has been increasing steadily as a result of favorable prices, declining level of ground nut production owing to drought and the subsequent incidence of groundnut rosette virus disease in the early 70s, which brought about the collapse of the famous Kano groundnut pyramid.

The crop is often referred to as "queen" of vegetable oil because of its uses as condiments in houses and as ingredients in manufacture of paints, soaps, cosmetics, perfumes and insecticides (Anonymous., 2004; Babaji et al. 2005). The whole seed is used on top of buns and snacks food, fried and eaten with sugar, or grinded raw and used for soup making (Onweme and Sinha 1991). Its contents of

sesamolone and sesamine make it useful as synergist for insecticides (Reamakers 2001). The quality of sesame oil is next to olive oil and therefore can be used as substitutes (Weiss, 1983). The seed contains 56% oil, 17-19% protein, 16 -18% carbohydrate and is also rich in calcium, phosphorus, iron and vitamins such as niacin, thiamin and riboflavin (Rehm and Espig, 1992).

1.2 PROBLEM STATEMENT

According to Paul (2011), agriculture in Nigeria has remained rudimentary and mostly in the hands of the resource poor in society, the returns in farming are marginal, regarded as “a way of life occupation” rather than a multi-faceted business, dominated by small holders and aged farmers who use antiquated production techniques, commodities still exported in raw form with no value addition, post- harvest losses due to inadequate storage and timely exit to markets and end users, input supply not under farmers control but under the control of politicians and middlemen thereby increasing costs and delays to timely farm operations.

In Jigawa and Kano State, despite the enormous potentials of vast cultivable land, suitable ecology, availability of labor both in terms of quantity and quality that favored sesame production, added with its economic importance in terms of increased income, employment generation and as a source of foreign exchange, its production is still rudimentary, production and productivity per unit area is still very low compared to what is obtainable in other areas of the world with similar growing conditions and research stations (Katanga and Buba, 2014).

In the same vein, Muhammed (2012) reported the sesame farmer's problems of access to improve varieties, input acquisition/utilization, accessing and adopting appropriate agronomic practices, post-harvest losses, stemming from inadequate storage and transport facilities, these problems affected the quality of the produce hence affecting the product prices. Moreover, the farmers are affected by low price, because product prices are generally low at harvest, and begin to appreciate when the season pass by, high prices are mostly realized during the lean supply period, and they rarely take advantage of this seasonal price differences because of limited income to cover their financial commitments, which in most cases have to be settled soon after harvest.

In spite of these problems however, the crop has a lot of potentials to replace groundnut especially where climatic conditions are favorable for the crop growth. Currently, groundnut production in the predominant Kano and Jigawa states has seriously declined due to drought and incidences of the groundnut rosette virus (Katanga and Buba, 2014) and this brought about a sudden switch or shift to alternative oil crop sesame.

Sokomi, (2011) reported that, the capacity to process sesame both in terms of quantity and quality is also lacking, because processors lacks relevant processing equipment, the products are also of low unit value while processing is limited to cleaning and in few cases de-hulling. Marketing is also bedeviled with many layers of middle men, high occurrence of physical losses, high marketing cost coupled with market information being insufficient and adulterated products. Similarly, grades, standardization and quality control are inadequate, as such buyers are left to

do away with what is available and presented to them than making choice (Muhammad, 2007).

The continuum from production to the consumption and or export markets needs to be assessed in form of value chain study especially in view of identifying the major actors, linkages, governance, preferences, profitability and constraints. Similarly knowledge of the roles of the value chain actors; farmers, traders up to exporters are yet to be fully investigated and documented. The analysis of the sesame value chain in Jigawa-Kano axis state is therefore of exploratory importance. The study seeks to find answers to the following research question;

- i) Who are the actors in the sesame value chain and how are they linked?
- ii) What are the influences of the identified value chain actor's socio-economic characteristic on the output /volume of sesame produced or traded?
- iii) Who among the actors governed the sesame value chain?
- iv) What are the sesame physical characteristics preferred by the value chain actors?
- v) Is the value addition along the sesame value chain profitable?
- vi) What are the constraints in the sesame value chain?

1.3 OBJECTIVE OF THE STUDY

The broad objective of the study is to examine sesame value chain in Jigawa-Kano axis and the specific objectives are to:

- i) identify and describe the actors in the sesame value chain and the sesame market channel in the study area,

- ii) determine the influence of socio-economic characteristics of the value chain actors on the output/volume of sesame produced or traded,
- iii) describe the sesame value chain governance and identify the actor(s) with highest control of price and information,
- iv) determine the sesame physical characteristics that influence sesame preferences by the value chain actors,
- v) determine the profitability of the actors along the sesame value chain and
- vi) describe the constraints of the sesame value chain.

1.4 RESEARCH HYPOTHESIS

H₀ = socio-economic characteristics of the value chain actors has no influence on the output/volume of sesame produced or traded,

H_a = socio-economic characteristics of the value chain actors has influence on the output/volume of sesame produced or traded,

H₀ = sesame value chain is not governed by any actor,

H_a = sesame value chain is governed by actor(s),

H₀ = sesame physical characteristics has no influence on its preference by value chain actors

H_a = sesame physical characteristics has influence on its preference by value chain actors

H₀ = sesame value chain is not profitable

H_a = sesame value chain is profitable

H₀ = there are no constraints to sesame value chain

H_a = there are constraints to sesame value chain

1.5 JUSTIFICATION OF THE STUDY

Modernization of agriculture in terms of increasing productivity through value addition increases income and improve the living condition of value chain participants. Sesame seed business in Nigeria is worth over Nine Billion Naira annually; this figure represents transaction on just raw sesame seeds. However, with value added by processing of the seed, the value of business in this product can get well over Twenty Billion Naira. What more? Over 100,000 jobs can be created (Anga, 2007).

Value adding activities will encourage production and marketing, largely through direct and indirect effect on prices and revenues to the actors. Value addition in form of improved cleaning, sorting, grading, packaging and crushing for oil extraction could bring about various and higher quality products and hence high unit value that will enhance and increase foreign exchange earnings and trade. Moreover, there are needs for policies to target activities that will increase or add unit value to the sesame enterprises, in order to increase income, employment and consequently increases the general living standard of the participants. This information could also be utilized by donor agencies and development partners to design and implement developmental projects.

Value chain actor's preferences information will be of great value to sesame breeders to help target traits that lead to sesame and its products having characteristics that consumers want. The benefit of this new product will be felt directly by value chain actors as they are able to have better market for their products.

The findings of this study will contribute to the understanding of the factors that affect sesame value chain actors in this axis and beyond, provide a basis for formulation of appropriate policies and programmes for the promotion of the sesame value chain at local, regional and national levels, add to the existing stock of knowledge on sesame and can serve as a stepping stone for further researches.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 SESAME AS COMMERCIAL CROP

Sesame is mainly grown for its seeds that contain approximately 50% oil and 25% protein (Burden, 2005). Over 7 million hectares of land is devoted to the crop world-wide yielding an output of 3.66 million tons of which Asia and Africa respectively account for 69% and 26% of the world sesame production (FAO, 2005). Nigeria has a substantial role in the global sesame trade and it is the primary supplier of sesame seed to Japan the world largest importer, (USAID, 2009). Based on color difference, the brown and white types of sesame are cultivated by Nigeria farmers and the oil content of brown sesame is slightly higher (52%) compared with the white variety (Tihamiyu *et al.*, 2013). The crop has started receiving wide acceptance among farmers in other parts of the country because of the economic importance of its oil in the international markets (Olowe, 2007).

Sesame is an important component of Nigeria's agricultural export. About 70% of sesame produced in the country is being traded overseas and it account for annual export value of N12.8 billion (NBF, 2015) with Nigeria exporting 23,700 metric tons out of the global export of 900,000 metric tonnes. Major destinations for export include China, Japan, Syria, European Union, Korea, Turkey and the Middle East. The wide range of sesame seed markets is a great opportunity to earn additional foreign exchange for the country if its production potentials are exploited. The realization of the potential of sesame production in the acquisition of foreign currency for the country made increased production of the crop a prominent

priority in the Agricultural Transformation Agenda of the Federal Government of Nigeria. To this end, farmers are being encouraged to produce sesame in all agro ecological zones of the country. Nigeria has the technology to produce significant output of sesame for export in view of the yield potentials of the varieties released to farmers (NCRI, 2012).

2.2 CONCEPTUAL FRAMEWORK

2.2.1 Definition of Value Chain

Global value chain concept as pointed out by Global Value Chain Initiative (GVCI), (2007) is an arrangement that describes the linkages of participants and their value creating activities that enhance the movement of goods and services from production, processing to the end user (consumer). The number and the conduct of participants along the chain determine its efficiency, pricing and returns accruing to each participant at every stage (GVCI, 2007).

Kaplinsky (1999) defined value chain to consist a full range of activities that are required to bring a product or service from conception, through the different phases of production, to delivery to final consumer and disposal after use. Towards the same vein, Kaplinsky and Morris, (2011) put forward value chain as a situation when all stakeholders in the chain operate in a way to maximize the generation of value along the chain. The concept can be viewed in two fold; the narrow and broad view. Narrow view is when value chain is considered within a firm producing certain output which includes the conception and design stage, input acquisition, main production and the marketing or distributive arrangements as such all these activities add value to the final product.

The broader approach of value chain connotes a complex range of activities undertaken by numerous actors: farmers, traders, processors, and exporters; value chain supporters like input suppliers and the financial institutions and the influencers which are basically the regulatory frame work of the value chain, all in an effort to bring raw material to the retail of the final product. The broad concept takes cognizance of activities implemented by multiple actors or enterprises such that all backward and forward linkages are considered until the different produce are link to the final consumer.

In addition, Hartwich *et al;* (2010) define value chains as mechanism that allows producers, processors, buyers and sellers separated by space and time to add value to products and services as they pass from one segment of the chain to the next until the products gets to the final consumers. Therefore value chain analysis helps to show what different players (actors) in the chain put in and get out (Daniel, 2007).

In order to generate improvements in the supply or quality of any product, one needs to consider all aspects of the range of steps in the chain of events from production to consumption, including both opportunities and constraints, and the demand and supply of necessary products and services (Kaplinsky, 1999). Taking a value chain approach to economic development involves addressing the major constraints and opportunities faced by farmers (producers), processors, traders and other businesses at multiple levels and points along a given value chain. This will inevitably include a wide range of activities such as ensuring access to the full range of necessary inputs, facilitating access to cheaper or better inputs,

strengthening the delivery of business and financial services, enabling the flow of information, facilitating improved market access, or increasing access to higher-value markets or value-added products.

Value chain analysis is a very useful conceptual tool when trying to understand the factors that impact the long-term profitability of a business and when developing a successful strategic plan for that business. The analysis facilitates an improved understanding of competitive challenges, helps in the identification of relationships and coordination mechanisms, and assists in understanding how chain actors deal with powers and who governs or influences the chain. Developing value chains is often about improving access to markets and ensuring a more efficient product flow while ensuring that all actors in the chain benefit. Changing agricultural contexts, rural to urban migration, and resulting changes for rural employment, the need for pro-poor development, as well as a changing international scene (not least the increase in oil prices) all indicate the importance of value-chain (GVCI, 2007).

Kaplinsky and Morris (2011) perceived an increase in the gap in income distribution within and between countries of the world. However, they argue that value chain analysis can help to explain the processes particularly in a dynamic perspective, through mapping the range of activities along a value chain, its analysis pose to decompose the total value chain earnings in to the rewards that accrue to each different actor in the chain. To explain the distribution of the earnings, value chain analysis is the only way to get such information as oppose to other ways of assessing the global distribution pattern which only give partial insight. More so,

value chain analysis sheds light on how firms, regions and countries are linked to the global economy. The mode of insertion determines to a large extent the distributional outcomes of global production system and the capacity with which individuals upgraded their operations and thus lunch themselves on to the path of sustainable income growth. In the value chain analysis, the international trade relations are considered as part of the network of producers, exporters, importers and suppliers. Thus within this context, the success of developing countries and market actors in the regions lies in the ability of accessing these networks.

2.2.2 Components of Value Chain

Daniel, (2007) reported that, value chain integrates three important levels which allows for the discovering of potentials and bottlenecks within the levels and in the dynamic interaction between them. Examining the value chain will reveal the following;

- i Value chain actors
- ii Value chain supporters
- iii Value chain influencers

Value chain actors or participants are the major stakeholders in the value chain Mustapha, (2012) and Tiamiyu *et al* (2013). These are directly involved with primary activities of production, processing and marketing of the product. The actors exercise ownership of the product in time and space as it moves along the chain. Value chain supporters include individual or organizations that render services to the value chain actors; they include financiers of the agro-businesses, information disseminators, and other marketing extension agents. Value chain

influencers are the organization and institution that are responsible for setting up the regulatory frame work for the value chain. Favorable business environment provides economic and political stability and allows for efficient business operations which lead to greater innovation and creativity.

2.2.3 Value Chain Actors

Different types of value chain participants could be identified between producers and consumers; these include input suppliers, producers, farm commission agents, rural wholesalers, rural retailers, urban commission agents, urban wholesalers, urban retailers, financial institution both formal and non formal, and the enabling environment of policy making that regulate the process, all these performing varied marketing functions. Adamu, (2010) also enumerated market participants to include producers, local assemblers, local transporters, commission agents, wholesalers, rural assemblers, lorry transporters, urban wholesalers and urban retailers for different agricultural commodities.

2.2.4 Commodity Channel

Commodity channel refers to the sequence of intermediaries or middlemen in the market through which commodities pass from conception to producers through processing to consumers. Aminu and Musa (2007) described the main channel of tomato starting from the producers through commission agents, assemblers or regional wholesalers, urban wholesalers, retailers and finally ending with the consumers in Kano River Irrigation Project (KRIP). It should be noted however, that different agricultural commodities follow different channels in their marketing process.

2.2.5 Value Chain Governance

This entails the type of power relationship that exist, and the pattern of information sharing among chain actors. Value chains have been seen as a conductor enhancing information flows between various actors in the chain, which has resulted to quite a number of governance debates. These governance issues have everything to do with the complexities of power relations within the chain, which determine how financial, material and human resources are allocated and flow within the chain (Damulak 2012).

Roduner, (2007) mentioned that firms are usually interlinked with a variety of sourcing and contracting which leads to the governance concept of power relations of which two types of governance structures within the chain are identifiable, these are; the producer driven chain (which consist of firms, which are interlinked) and the buyer driven chain, which does not consist of firms, which are interlinked, but a group of local farmers and businessmen. Thus it would help in unraveling the actors with the most control over the activities.

Gereffi *et al.*, (2005) developed a framework called global commodity chains that tied the concept of the value-added chain directly to the global organization of industries which led to the importance of chain coordination. Humphrey, (2005) define chain coordination as inter-firm relationships and institutional mechanisms through which non-market coordination of activities in the chain is achieved. This later, led to the birth of five analytical aspects of governance types of relationships in existence within the value chains.

1. Arms length market relations- This is the situation where neither the buyer nor the seller collaborate in defining the product therefore the supplier defines it without reference to any particular customer. Therefore; the sellers set the prices for buyers due to low levels of information exchange.
2. Modular Relationships- This is when a product specification is relatively complex and standardized; there is very little information flow between the buyer and the seller. The supply is however, very efficient with a low degree of explicit coordination.
3. Network relationships- this refers to the cooperation between actors. When product specifications cannot be codified, transactions are complex, and supplier capabilities are high, relational value chain governance can be expected. This is because tacit knowledge must be exchanged between buyers and sellers, and because highly competent suppliers provide a strong motivation for lead firms to outsource.
4. Quasi Hierarchy/captive relationships- In this case, product complexity is high as well as detailed instructions which lead to codification, here global buyers set parameters due to product differentiations strategy in order to avoid the risk of supplier failure due to the low capabilities of the suppliers. More so, combinations of cooperation through which asymmetrical power relations exist of which buyers dominate suppliers.
5. Hierarchical relationships- Vertical Integration where the buyer takes hold of all operations carried out due to the low competence of the supplier not just at the production level but it can also be in other areas of marketing

Accordingly Theodore, (2010) define governance as a description of the dynamic distribution of power, learning, and benefits among a value chain's firms. In the same vein, United Nations Organization for Economic Cooperation and Development OECD (2002) define governance as the power to control, influence, set the modes and rules of interaction in value chains. While the term can have many meanings, it use to describe the sharing of information and systematic standards promoted by the "governing" entity in a value chain. In his contribution Altenberg (2006) reported that, certain key actors – the lead firms or "governors of value chains" – have the capability and power to define and set the parameters of contracts and subcontracts in their supply chains. For example, they can define chain-wide product and process standards, quantities, and conditions of delivery. This power may be based on ownership of well established brand names, proprietary technology, or exclusive information about different product markets, which enable the firm to act as a system integrator. The governing entity is often a lead firm that is closer to the market or business environment that the value chain inhabits. Leadership or being a "lead" firm implies success, efficiency, a competitive composure, or direct information.

In a similar vein, Kaplinsky, (2000) argued that, the concept of "governance of value chains" implies that "there are key actors in the chain who take responsibility for the inter-firm division of labor, and for the capacities of particular participants to upgrade their activities. Power and governance are common themes in value chains, but their relation to the prospects of upgrading value chains in developing countries is inconclusive. Hence it is very important to recognize that, in

reality, value chains are not purely buyer-driven or producer-driven, and that they can and do change. Indeed, the creation of competitive advantage by elements of the value chain as reported by Porter, (1985) is a means to alter the power balance among actors within the chain, or vis-à-vis competing chains.

2.3 THEORETICAL FRAMEWORK

2.3.1 Profitability Analysis of Value Chain

Value chain analysis is a very useful conceptual tool when trying to understand the factors that impact the long-term profitability of a business. Gross and marketing margins are budgetary tool used in evaluating economic profitability of enterprises as employed by (Eluagu and Nwali, 1999; Tihamiyu, 2002, Somda et al., 2003, Olukosi and Erharbor, 2005, Achike and Anzaku 2010, Abu, *et al.*, 2011 and Tihamiyu et al, 2013). Kushwaha and Adamu (2003) defined marketing margin as the differences in price paid for a commodity at different stages of a marketing system. Olukosi and Erharbor, (2005) further stated that time; place, form and possession are important factors that affect marketing margin. Hence marketing margin represents differences in price of a given commodity at different stages of time, place, form and possession as the commodity passed from the farmer to the final consumer. It is made up of different costs of performing marketing functions like storage, transport and processing. Alternatively it is made up of returns to different factors of marketing such as transportation, storage, processing, other value additions, capital and management used in marketing. It should however be noted that the components of marketing margin differ from one product to another,

since the functions required to be performed on commodities differ. The model for marketing margin is;

$$MM = TR - TMC \text{ ----- (1)}$$

MM = Marketing margin (₦/ton).

TR = Total revenue (₦/ton) for selling sesame.

TMC = Total marketing cost (₦/ton)

2.3.2 Review of Empirical Studies on Value Chain

The concept of value chain traces its source to business management which was described by Poter (1985) in competitive advantage: Creating and sustaining superior performance. Value chain analysis has been employed in the development sector as a means of identifying poverty reduction strategies by upgrading along the chain. ICRISAT (2013) has investigated strengthening the value chain for sweet sorghum as biofuel in India. It was aimed at providing a sustainable means of making ethanol that would increase the incomes of rural poor without sacrificing food and fodder security while protecting the environment. Ugonna *et al*, (2013) uses value chain approach to study potato production, processing and conversion to different products in Nigeria while identifying the existing technologies and technology gaps. Phillips *et al.*, (2013) used value chain to analyzed productivity, improve livelihood , income and food security among yam farmers in Nigeria. Commodity chain analysis was used by Maiadua (2013) to study hide and skin value chain in Daura local government area of Katsina State. Towards the same vein Adeoye *et al*, (2013) studied plantain value chain mapping in south western Nigeria. Maize value chain in Kano State was studied by (Abdullahi, 2012). Ouma

and Jagwe (2010) investigated banana value chain in Central Africa towards identifying constraints and opportunities of small holder producer position in the value chain while designing strategies that would minimize the effects of agricultural commodity price fluctuations. Mustapha (2012) also used the approach to study economic analysis of rice value chain in Kano State, Nigeria. The organization of rice value chain, different processing technologies, profitability of value chain activities as well as factors determining rice output and consumer preference for both local and imported rice was assessed. Legese *et al*, (2008) assessed live animals and export meat value chain to determine constraints and opportunities for enhancing the efficiency of meat export Ethiopia. The study was conducted using Rapid Market Appraisal (RMA) to ascertain the characteristics of the marketing system, mapping the supply chain, understanding constraints and opportunities and as a basis for designing follow-up in value chain researches. Webber (2006) used benchmarking to study coffee value chain in Tanzania. Benchmarking compare the performance of a company's value chain to its self at different time or to another value chain within a country or between countries toward providing a baseline such that information could be compared to guide decision and actions.

Humphrey, (2005) reported that, value chain framework have been utilized by development practitioners and researchers to capture the interactions of dynamic and complex markets in developing countries and to examine the interrelationships between the diverse actors involved in the stages of the marketing. In a similar development, Humphrey (2005) asserts that, value chain dwells on the power

relationships based on the governance of the chain and have highlighted potential point of entry for small holders. Value chain analysis allow for the assessment of the linkages between and among the productive activities along the chain when the framework is considered beyond the firm or activity specific. Additionally, the approach provides a framework for analyzing the nature and determinant of competitiveness.

2.3.3 Empirical Studies on Sesame Value Chain

Researches were conducted to determine the value chain actors, commodity channel, profitability, preferences, opportunities and constraints of sesame enterprises aim at determining the costs, return and challenges of the enterprises. Some of these researches were cited in this section.

Sidi *et al.*, (2014) studied the value chain analysis of sesame in Bade and Jakusko Local Government areas of Yobe State, Nigeria. It specifically examined the socio-economic characteristics of the sesame farmers; describe the sources of inputs, characteristics and roles of value chain actors in sesame production and marketing. Data for the study were obtained using structured questionnaire and interview. Descriptive statistics, net margin and value added models were used in the data analysis. The models are;

$$NFI = GFI - TC \dots\dots\dots (2)$$

Where:

NFI = Net Farm Income (₦/ha) for sesame production.

GFI = Gross Farm Income (₦/ha) for sesame production.

TC = Total Cost (₦/ha) for sesame production.

$$VA = C_{pt} - C_{pu} \dots\dots\dots (3)$$

Where,

VA = Value Added

C_{pt} = Cost of purchase of transformed sesame

C_{pu} = Cost of sesame in untransformed form

Ian and Gabriel (2014) examined Agricultural value chain analysis of maize, rice, groundnuts, sunflower and Sesame in Northern Uganda under the project of Action Against Hunger/ ACF International. This included mapping of the value chains, detailed descriptions of the main actors involved in the value chains (from farmers to end consumers) and lastly, analysis of how the value is distributed across the different actors.

Additionally Gizaki *et al* (2014) examined the characteristics of sesame value chain development program in Bauchi State, Nigeria. The study aimed at maximizing agricultural revenue through the production of sesame. Descriptive statistics and farm budgeting techniques were used to analyze the data. The study revealed an average production output of 649.90kg/ha of sesame with ₦ 86,000/ha as gross margin.

Bennet, (2007), and Bennet, (2008) conducted a value chain analysis of sesame in Mozambique and Tanzania. Data for the study were analyzed using descriptive statistics, cost- benefit and SWOT (Strength, Weakness, Opportunities and Threat) analysis. Result of the study identified Farmers, Primary societies, Regional cooperative unions, Regional Governments, Export traders and National Government policy makers as the key actors in the value chain. The purpose of the

research was to understand how the sesame marketing system and its entire actors identified during the earlier value chain analysis were responding to the recent significant changes in marketing arrangements in Tanzania. The directive that all sesame should be traded through Primary Cooperatives has been applied with varying degrees of success and, while the policy response by the government of Tanzania responds to several of the recommendations in the 2007 value chain analysis, there were some concerns about its implications for the sesame project success. Of greater importance, the impact on farmers was uncertain and the report shed light on that and other relevant issues.

Kindie (2007) conducted another study on sesame market chain analysis: the case of Metema Woreda, North Gondar zone, Amhara National Region of Ethiopia. The study identified producers, assemblers/village collectors, wholesalers, cooperatives, transporters, brokers, commission agents, and exporters as the sesame market participants in the study area. It also revealed that 94% of the sesame production was supplied to the market. The major determinant factors for market supply were estimated by OLS regression. The sesame market performance was also measured using indicators of marketing margins and the level market integration. Critical periods for sesame purchase were identified and 78% of the total marketed supply was transacted during November, December and January, 2006. Transport cost was identified as the major cost component of marketing costs which accounted for 31.52% and 60.20% of the total cost wholesalers and exporters, respectively. The integration analysis indicated that there existed market

integration between Metema, Mekele and Addis Ababa markets, showing relative market efficiency in these markets.

A study was conducted by Sokomi, (2011) on the commodity chain analysis of beniseed marketing in Kano and Jigawa States. Cluster sampling technique was employed to determine the different market participants. Data were analyzed using descriptive statistic and gross margin was used to estimate the profitability of the enterprises. Result identified producers, traders, processors and consumers as the actors in the commodity chain. ₦43, 011.44 and ₦143, 391.44 were obtained as farmer/ha profitability for on- season and off-season, respectively. Gross margin estimate on a kg of beniseed by traders was found to be ₦12.99 and ₦14.61 in the on-season and off-season respectively. Pests and diseases, insufficient farm inputs, weather uncertainty, insufficient extension services, poor transportation network, inadequate funding, low product prices, lack of prior marketing information, price influence by exporters, product adulteration and risk of contract transaction were some of the challenges adduced by the chain actors.

2.3.4 Empirical Studies on Sesame Marketing

Achike and Anzaku (2010) assessed the performance of the marketing system of benniseed in Nasarawa State. The data were analyzed using marketing margin models, Analysis of Variance (ANOVA) and Duncan multiple range test. Primary data used for analysis were generated through random sampling of 90 farmers and 270 regular middlemen. The results showed that the mean marketing margin was 18.2%, marketing costs 12.8%, net profit 8.3% and farmer's share 78.9% of the retail price. These values indicated efficient and competitive trends

under the prevailing circumstances. ANOVA results showed that marketing margins at the three main market centers were significant at 0.05 level of probability while the multiple range tests showed that marketing margin was highest in Doma and Nassarawa central markets.

Profitability of sesame production and marketing in Nigeria was carried out by Tihamiyu *et al*, (2013). Data were collected using interview schedules with government officials, producers and marketers in five randomly selected sesame producing states. The data were analyzed using partial budgeting technique. The results obtained showed that the gross margin per hectare and return on naira invested on sesame production were ₦9, 190.00 and 0.15, respectively. Most of the marketers procured sesame directly from the farmers. Average turnover by marketers was ₦20, 688,937 per season while the gross market margin and the gross export margin was ₦26, 000, ₦ 24,000 and ₦11, 000 per ton, respectively. The major constraints to sesame production and marketing were low yield, high cost of transportation to the port and low fob pricing.

2.4 ANALYTICAL FRAMEWORK

2.4.1 Socio-Economic Characteristics of the Principal Value Chain Actors

Several analytical techniques and models were used in the determination of socio-economic characteristics of value chain actors, these models includes, descriptive statistics (use of percentages, mean, maximum, minimum and frequency etc). The procedure was employed by researchers like Bennet, (2007), Bennet, (2008) and Abu, et al, 2011. Another procedure involved the use of Analysis of Variance (ANOVA), Ordinary Least square method and assessment of the

differentials using Duncan New Multiple Range Test (DNMRT) as used by (Kindie, 2007). Therefore, in the context of this research, the use of descriptive statistics was employed because of its simplicity and precision.

2.4.2 Profitability of the Sesame Enterprises

Gross and marketing margin, Benefit Cost Ratio (BCR), Internal Rate of Returns (IRR) are some of the analytical models used in the assessment of cost and returns accrued to actors in the value chain. Bennet, (2007) and Bennet, (2007) used BCR to assess the profitability of sesame Marketing system. For the purpose of this research, gross and marketing margin models were selected for its simplicity in calculation and its wider acceptance among researchers. Gross and marketing margin are budgetary tool used in evaluating economic profitability of enterprises as employed by (Eluagu and Nwali, 1999; Tihamiyu 2002, Somda *et al.*, 2003, Olukosi and Erharbor, 2005, Abu, *et al.*, 2011 and Tihamiyu et al, 2013).

2.4.3 Preferences to Sesame Physical Attributes

Various analytical methods have been used in measuring consumer's acceptance and preference for agricultural products. These include; product improvement index model Thomas (2002), Analysis of Variance (ANOVA) Mead *et al.*, (1993), hedonic pricing method Musa *et al.*, (2012), Mohammed *et al.*, (2014) and descriptive statistics (Mustapha, 2012). This study adopts the use of descriptive statistics and hedonic regression because of its wider application and simplicity.

2.4.4 Constraints to Sesame Value Chain

Different scholars used different techniques to draw inferences about factors that constraints the performances of sesame value chain, some of these techniques

include descriptive statistics and Strength, Weakness, Opportunities and Threats (SWOT) analysis as used by Bennet, (2008) and Likert scale put forward by Achike and Anzaku, (2010). Descriptive statistics was employed in this research for its simplicity and wider usage.

Major constraints to sesame production and marketing were low yield, high cost of transportation to the port and low fob pricing as reported by (Tiamiyu *et al*, 2013) in a study conducted to examine profitability of sesame production and marketing in Nigeria. Similarly, Sidi *et al.*, (2014) studied the value chain analysis of sesame in Bade and Jakusko Local Government areas of Yobe State, Nigeria and reported challenges of inadequate production and trading capital coupled with credit facility being unavailable and a lack of market information on the side of the producers.

CHAPTER THREE

3.0 METHODOLOGY

3.1 STUDY AREA

The study area is Jigawa-Kano axis; because the study covered some areas in Jigawa State for production and marketing. While in Kano State specifically Dawanau market was selected for its role in sesame marketing in which processing and exports activities were studied.

Jigawa State was created out of former Kano State in August, 1991. It has population of 4, 361, 002 (NPC, 2006) and a projected population of 5, 790, 329 in 2015 representing 3.2% of annual growth rate (NPC, 2006), with about 80% of the population engaged in crop and animal agriculture. It lies between longitudes 8.00° E to $10^{\circ}.15'$ E and latitudes 11.00° N and 13.00° N in the Sudan savanna with traces of Guinea savanna in the southern part of the State (J-SDSD, 2005). It consists of 27 Local Government Areas.

Kano State is situated in the Sudan Savannah agro-ecological zone of Nigeria located between longitudes $7^{\circ}.34'$ E to $9^{\circ}. 25'$ E and latitudes $9^{\circ}.30'$ N to $12^{\circ}.37'$ N. The State is bordered to the west and northwest by Katsina State, to the east and northeast by Jigawa State to the south by Bauchi State and to the southwest by Kaduna State (KNSG, 2004). The State has a population of 9, 383, 682 (NPC, 2006) and a projected population of 12, 459, 251 in 2015 representing an annual growth of 3.2% (NPC, 2006). Historically, it is an agricultural and commercial State which was known for groundnut production and trading, inter regional trade and a major commercial centre in northern Nigeria.

3.2 SAMPLING PROCEDURE

The design of the research was based on the Jigawa State Agricultural Development Project (ADP) zonation, the State was divided into 4 Agricultural zones (Birnin Kudu, Hadejia, Gumel and Kazaure) for good representation. A multistage sampling technique was used. The first stage was the purposive selection of three agricultural zones of the ADP (Birnin Kudu, Hadejia, and Gumel) because of their status quo in production and marketing of sesame in the State. The second stage involved the purposive selection of two Local Government Areas (LGAs) within a zone, i.e. those with highest sesame production. Dutse and Kiyawa in Birnin Kudu zone; Taura and Garki in Gumel zone while Kafin Hausa and Kaugama in Hadejia zone. Two villages (highest in sesame production) were purposively selected from each of the six LGAs making a total of 12 villages; Kargo and 'Yargaba (Dutse), Katanga and Garko (Kiyawa), Kwalam and Chakwaikwawa (Taura), Garki and Kaya (Garki), Bulangu and Ruba (Kafin Hausa), and Dodori and Dalarin Lungu (Kaugama). Five sesame farmers were randomly selected from each of the selected villages using random number table making a total of sixty farmers that participated in the study at the entry point.

Table 1: Sample Size of Sesame Farmers

S/N	Zone	Local Govt.	Sample Villages	Sampling frame	Sampled farmers
1	Birnin Kudu	Dutse	‘Yargaba	20	5
			Kargo	18	5
		Kiyawa	Katanga	20	5
			Garko	19	5
2	Gumel	Taura	Kwalam	22	5
			Chakwaikwaiwa	20	5
		Garki	Garki	23	5
			Kaya	16	5
3	Hadejia	Kafin Hausa	Bulangu	22	5
			Ruba	17	5
		Kaugama	Dodori	22	5
			Dalarin Lungu	21	5
				82	20
Total				240	60

From the selected farmers, traders name were collected and formed the sampling frame from which thirty six number traders were randomly selected by balloting and participated in the study.

Table 2: Sample Size of Sesame Traders

S/N	Villages	Sampling frame	Sample size
1	'Yargaba	4	3
2	Kargo	3	3
3	Katanga	5	3
4	Garko	4	3
5	Kwalam	5	3
6	Chakwaikwaiwa	4	3
7	Garki	5	3
8	Kaya	3	3
9	Bulangu	4	3
10	Ruba	3	3
11	Dodori	3	3
12	Dalarin Lungu	4	3
Total		47	36

Processors names were collected from the traders and hence the processor's sampling frame evolved. Thirty six processors names were gotten from the traders and were all selected for the study. Similarly as a chain six number exporter were sourced from traders and also all selected because of their limited number.

Table 3: Selection of Sesame Processors and Exporters.

S/N	Location	Sampling frame	Sample size
Processors			
	Jigawa	36	36
		36	36
Exporters			
	Kano	6	6
		6	6
Total		42	42

3.3 DATA COLLECTION

Data for this study were collected using structured questionnaires by the researcher with the assistance of four trained enumerators. Data collected include information on the socio-economic characteristics such as age, gender, marital status, household size, educational status, and years of experience. Other information collected were on input-output relationships such as farm size, hired labor, amount of seed, fertilizer, pesticide, cost and returns, marketing cost/value addition, product preferences and constraints of the actors (farmers, traders, processors and exporters).

3.4 DATA ANALYSIS

Descriptive (percentages, mean, maximum, minimum and frequency) statistics was used to achieve objective i, iii, vi and part of objective iv, while inferential statistics (regression, farm budgetary techniques and marketing margin) were used to achieve objective ii, v and part of objective iv.

3.4.1 Model Specification

Farm budgetary techniques

The farm budget tool is widely used in farm management and production economics studies. It involves the calculation of Total Cost and Total Revenue for a given production period, the difference of which is a measure of profit (or loss) or net return for that period (Hamidou, 2006). It is a detailed physical and financial plan for the operation of a farm for a certain period. These techniques were used by (Eluagu and Nwali, 1999; Tihamiyu 2002, Somda *et. al.*, 2003, Musa, (2003); Olukosi and Erharbor, 2005, Achike and Anzaku 2010, Abu, *et al.*, 2011 and

Tiamiyu et al, 2013). Sidi, *et, al.*, (2014) to determine the profitability of different farm enterprises. The techniques were used to achieve objective five (5) of the study.

Net Farm Income (NFI) was determined for sesame production. Gross ratios, operating ratios and return to Naira invested were also computed as the profitability ratios. Marketing Margin was used to determine the profitability of sesame enterprises in the downstream level of the value chain. The models were specified as follows:

Net Farm Income (NFI) was specified as:

$$NFI = GFI - TC \dots\dots\dots (4)$$

Where:

NFI = Net Farm Income (₦/ha) for sesame production.

GFI = Gross Farm Income (₦/ha) for sesame production.

TC = Total Cost (₦/ha) for sesame production.

Total cost is the summation of the Total Variable Costs (TVC) and the Total Fixed Costs (TFC). Total Variable Cost (₦/ha include costs of all variable inputs used in sesame production such as costs of labour, seeds, fertilizer and pesticide. Total Fixed Cost (₦/ha) include rent paid on land and depreciation on fixed inputs such as sprayer, cutlass and hoe.

Also Gross Ratio (GR), measuring the overall financial success of the farm was determined using the relation as given by Olukosi and Erhabor (2005) as:

$$GR = TC/TR \dots\dots\dots (5)$$

Where:

GR= Gross Ratio for sesame production.

TC= Total Cost for sesame production.

$$TC = P_1X_1 + P_2X_2 + P_3X_3 + P_4X_4 + P_5 + P_6 + P_7 + \dots \dots \dots (6)$$

Where:

P_1 = Unit price of labour for the production of sesame production. (₦).

X_1 = Average quantity of labour used for sesame produced per hectare (Man days).

P_2 = Unit price of seed used for sesame production (₦).

X_2 = Average quantity of seed used for sesame produced (Kg/ha).

P_3 = Unit price of Fertilizer used for the production of sesame (₦).

X_3 = Average quantity of Fertilizer used for sesame produced (Kg/ha).

P_4 = Unit price of Pesticide used for the production sesame (₦).

X_4 = Average quantity of pesticide used for sesame produced (Ltr/ha).

P_5 = Depreciated cost of sprayer used for sesame produced (₦/ha)

P_6 = Depreciated cost of hoe and cutlass used for sesame (₦/ha).

P_7 = Rent paid for using land for sesame produced (₦/ha).

TR= Total Revenue for sesame production (₦/ha).

Ideally, a ratio of less than 1 is desirable, and the lower the ratio, the higher, the profit (Olukosi and Erhabor, 2005).

Operating Ratio (OR) which measures the solvency of the farm was also used in this study to further indicate the profitability of the farm business. A ratio of one implies break-even and a ratio greater than one implies a loss and the lower the ratio, the higher, the profit. Operating Ratio was given by Olukosi and Erhabor (2005) as:

$$OR = TVC/TR \dots\dots\dots (7)$$

Where:

OR= Operating Ratio for sesame production..

TVC = Total Variable Cost for sesame production.

TR = Total Revenue for sesame production..

Return to Naira invested defined as the total farm income divided by total cost of production was used in the study as expressed also by Olukosi *et al.*, (2005) as:

$$RNI = TFI/TC \dots\dots\dots (8)$$

Where:

RNI = Return to Naira (capital) invested for sesame production..

TFI = Total Farm Income for sesame production..

TC = Total cost of sesame production.

Marketing margin

Marketing margin was used to determine sesame marketing, processing and exports profitability. Marketing margin refers to the difference in prices paid for a commodity at different stages of the marketing system. It therefore represent difference in price of a given commodity at different stages of time, form, place and possession as it moves from the primary producer to the ultimate consumer Olukosi *et al.*, (2005). At each intermediary level, it is the difference between price received on resale and the purchase price. It is as expressed as;

$$MM = TR- TMC \text{ -----} (9)$$

MM = Marketing margin (₦/ton).

TR = Total revenue (₦/ton)) for selling sesame.

TMC = Total marketing cost (₦/ton)

$$TMC = C_1 + C_2 + C_3 + C_4 + C_5 + C_6 \dots\dots\dots (10)$$

Where:

C₁ = Purchase price (₦/ton) of sesame.

C₂ = Cost of transportation (₦/ton) of sesame

C₃ = Cost of handling (knitting, loading and off-loading) (₦/ton) of sesame

C₄ = Cost of sacks (₦/ton)

C₅ = Commission charges (₦/ton) of sesame

C₆ = Tax (₦/ton) paid for marketing sesame.

Processing margin

Processing Margin is the dependent variable in the analysis of the profit of the sesame processors and was computed using the model below;

$$PM (\text{₦}) = TR - TVC \dots\dots\dots (11)$$

Where,

PM = Processing margin of sesame (₦/Kg)

TR = Total revenue (₦/Kg) of sesame

TVC = Total Variable Cost

$$TVC = C_1 + C_2 + C_3 + C_4 + C_5 \dots\dots\dots(12)$$

Where:

C₁ = Purchase price (₦/kg) of sesame.

C₂ = Cost of handling and transportation (₦/kg) of sesame

C₃ = Cost of cleaning and de-hulling (₦/kg)

C₄ = Cost of frying and drying (₦/kg) of sesame

C₅ = Cost of pasting with sugar (₦/kg) of sesame

Export margin

Export margin was calculated to determine the profitability of the exporters in the sesame value chain and was computed using the this model as follows,

$$EM (\text{₦}) = TR - TVC \text{ ----- (13)}$$

Where,

EM = Export margin of sesame (₦/ton)

TR = Total revenue (₦/ton) of sesame

TVC = Total variable cost (₦/ton)

$$TVC = C_1 + C_2 + C_3 + C_4 + C_5 \text{ (14)}$$

Where:

C₁ = Purchase price (₦/ton) of processed sesame.

C₂ = Cost of transportation to port (₦/ton) of sesame

C₃ = Cost of freight and forwarding (₦/ton) of sesame

C₄ = Cost of documentation (₦/ton) of sesame

C₅ = Cost of inspection (₦/ton) of sesame

Multiple regressions

This was used to achieve objective ii (using SPSS 16.0 version) to determine the relationship between socio-economic characteristics and the output of the VCAs as it was earlier employed by Musa, (2003) and (Ibekwe and Adesope 2010).

Multiple regressions are a causal relationship between the dependent variable and two or more independent variables in the study. The dependent

variable is the output which is the quantity of sesame produced or traded while the independent variables are the socio-economic characteristics of the principal value chain actors such as age, gender, marital, household size, educational status and years of experience. The regression model in its implicit form can be specified as;

$$Y = f(X_1, X_2, X_3, X_4, \dots, X_n, U) \dots \dots \dots (15)$$

Where Y is the output or quantity of sesame produced or traded and the dependent variable while X₁ to X_n are the explanatory variables and U is the error term.

A. For Sesame farmers, the regression was run excluding the large scale farmers to avoid a spurious regression due to the large effect (Objective ii):

For farmers, the output of sesame was the dependent variables, while the independent variables were the socio-economic attributes as follows;

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, u) \dots \dots \dots (16)$$

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + u \dots \dots \dots (17)$$

Where:

Y = Total output of Sesame (Kg) produced.

X₁ = Age of Sesame farmer (years)

X₂ = Marital status

X₃ = Household size (Number)

X₄ = Years of education (yrs)

X₅ = Years of experience in sesame production (years)

X₆ = farm size (ha)

u = Error term

f=Functional notation

B. For Sesame traders (Objective ii):

$$Y = f(X_1, X_2, X_3, X_4, X_5, u) \dots\dots\dots (18)$$

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + u \dots\dots\dots (19)$$

Where:

Y = Total amount of Sesame (ton) traded.

X₁ = Age of Sesame traders (years)

X₂ = Marital status

X₃ = household size (No)

X₄ = Years of education (years)

X₅ = Years of experience in sesame trading (years)

u = Error term

f=Functional notation

C. For Sesame Processors (objective ii)

$$Y = f(X_1, X_2, X_3, X_4, X_5, u) \dots\dots\dots (20)$$

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + u \dots\dots\dots (21)$$

Where:

Y= Quantity of Sesame Processed (ton).

X₁ = Age of sesame processor (years)

X₂ = Marital status

X₃ = Household size (No)

X₄ = Years of education (years)

X₅ = Years of processing experience (years)

u = Error term

f= Functional notation

d. For Sesame Exporters (objective ii)

$$Y=f(X_1, X_2, X_3, X_4, u) \dots\dots\dots (22)$$

$$Y= a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+u \dots\dots\dots (23)$$

Where:

Y= Quantity of Sesame exported (ton).

X₁ = Age of sesame exporter (years)

X₂ = Household size (No)

X₃ = Years of education (years)

X₄ = Years of exports experience (years)

U = Error term

f= Functional notation

Hedonic pricing econometric model

Hedonic pricing econometric model was employed by Musa, (2003), Musa *et al.*, (2012) and Mohammed *et al.*, (2014) which make use of the consumer goods characteristic model. It describes the price of a good as linear summation of the implicit value of its attributes. Therefore the commodity characteristics model for sesame is mathematically express as;

$$P_s = \sum_{j=1}^M X_{sj} P_{sj} \dots\dots\dots (24)$$

Where,

P_s = Price of Sesame

X_{sj} = Sesame Characteristics j , such as grain size, color, presence or absence of foreign material such as sand and seed of other plant.

P_{sj} = price of characteristic j

Table 4: Coding key for Sesame seed Physical Characteristics

Variable	Coding
Seed size	Small (< 2mm)
	Big (2.1-3.5 mm)
Seed Color	White
	Brown
Seed variety	Improved
	Local
Seed Source	Dan Kano
	Dan Maiduguri
	Dan lafiya
Seed composition	Below 5% foreign material
	Above 5% foreign material

Hedonic regression

Hedonic regression using SSPS version 16.0 was used to determine the effect of sesame physical characteristics on price and VCAs choice. It should be noted that the hedonic regression analysis essentially involved comparing variables along the same regression line and also comparing them between average situations within variables, the indicator with the highest frequency were used as the baseline for comparison and therefore did not appear in the regression (Musa, (2003), Musa *et al.*, (2012) and Mohammed *et al.*, (2014)

The hedonic regression model used was specified in the general form as:

$$Y=f(X_1, X_2, X_3, X_4, u) \dots \dots \dots (25)$$

Where:

Y= price paid for sesame (₦).

F = Functional notation

X₁- X_n = Independent or explanatory variables

U = Error term

As derived as from equation above

$$Y= a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5u \text{ -----} (26)$$

Where,

Y= price paid for sesame (₦).

a = the intercept

b₁ – b₅ = the coefficient of Xs

X₁ = Variety of sesame

X₂ = Sesame seed size (mm)

X₃ = Sesame seed color (color chart μm)

X₄ = Sesame seed source (location)

X₅ = Sesame seed composition (level of impurity)

U = Error term

From the regression analysis of these parameters, R² value, the number of significant independent variables and the p-values were determined.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF SESAME VALUE CHAIN ACTORS AND SESAME MARKETING CHANNEL.

Different actors were identified (figure 1) along the sesame value chain, ranging from input suppliers to producers to exporters and or final consumers. The value chain actors identified include the farmers, traders (rural collectors, rural commission agents, bulk assemblers, and urban commission agents), processors and exporters. Value chain supporters were the input suppliers and the financiers while some institutional framework was also identified though not well developed.

Information on socio economic characteristics of sesame value chain actors such as age, gender, marital status household size, years of education, years in sesame production, and farm size presented were determined and presented in Tables 5a, 5b, 5c, and 5d.

Table 5a: Socio-economic Characteristics of Sesame Farmers

Variable	Frequency	Percentage	Min	Max	Mean	Std. Dev
Age			24	65	43.2	6.2
24-33	14	23.3				
34-43	23	38.3				
44-53	15	25.0				
54-63	5	8.3				
64-73	3	5.0				
Gender						
Male	60	100				
Marital status						
Single	6	10.0				
Married	54	90.0				
Household size			2	20	12	3.4
1-4	6	10				
5-9	13	21.7				
10-14	24	40.0				
15-19	9	15.0				
20-24	8	13.3				
Yrs of education			1	4	1.9	0.9
Qur'anic	23	38.3				
Primary	22	36.7				
Secondary	10	16.7				
Tertiary	5	8.3				
Yrs of experience			3	15	8.6	3.5
Farm size						
Small (< 2ha)	34	56.7				
Medium (2-5ha)	21	35				
Large (>5ha)	5	8.3				

Source: Field survey, 2013

Table 5b: Socio-economic Characteristics of Sesame Traders

Variable	Frequency	Percentage	Min	Max	Mean	Std. Dev
Age			25	70	44.7	8.5
25-34	4	11.1				
35-44	16	44.4				
45-54	11	30.6				
55-64	3	8.3				
65-74	2	5.6				
Gender						
Male	36	100				
Marital status						
Single	4	11.1				
Married	32	88.9				
Household Size			3	20	11	7.6
1-4	5	13.9				
5-9	10	27.7				
10-14	14	38.7				
15-19	4	11.1				
20-24	3	8.3				
Years of education			1	4	1.9	0.9
Qur'anic	9	25				
Primary	10	27.7				
Secondary	11	30.6				
Tertiary	6	16.7				
Years of experience			3	14	8	5.4
Trader's category						
Small	5	13.9				
Medium	20	55.5				
Large	11	30.6				

Source: Field Survey, 2013

Table 5c: Socio-economic Characteristics of Sesame Processors

Variables	Frequency	Percentage	Min	Max	Mean	Std Dev
Age			15	55	35.6	10.3
15-20	6	16.7				
21-25	9	25.0				
26-35	15	46.6				
36-45	4	11.1				
46-55	2	5.6				
Gender						
Female	36	100.0				
Marital status						
Married	32	88.9				
Divorced	4	11.1				
Household Size			2	15	8	7.1
1-3	5	13.9				
4-7	18	50.0				
8-11	10	27.8				
12-15	3	8.3				
Yrs of education			1	4	1.9	0.9
Qur'anic	18	50.0				
Primary	12	33.3				
Secondary	6	16.7				
Yrs of experience			4	15	9	3.4

Source: Field Survey, 2014

Table 5d: Socio-economic Characteristics of Sesame Exporters

Variables	Frequency	Percentage	Min	Max	Mean	Std Dev
Age			35	64	45	10.9
35-44	1	16.7				
45-54	3	50.0				
55-64	2	33.3				
Gender						
Male	6	100				
Marital status						
Male	6	100				
Household Size			2	7	5	2.6
1-3	2	33.3				
4-6	3	50.0				
7-10	1	16.7				
Literacy Level						
Tertiary	6	100				
Years of experience			7	13	10	3.1

Source: Field Survey, 2014

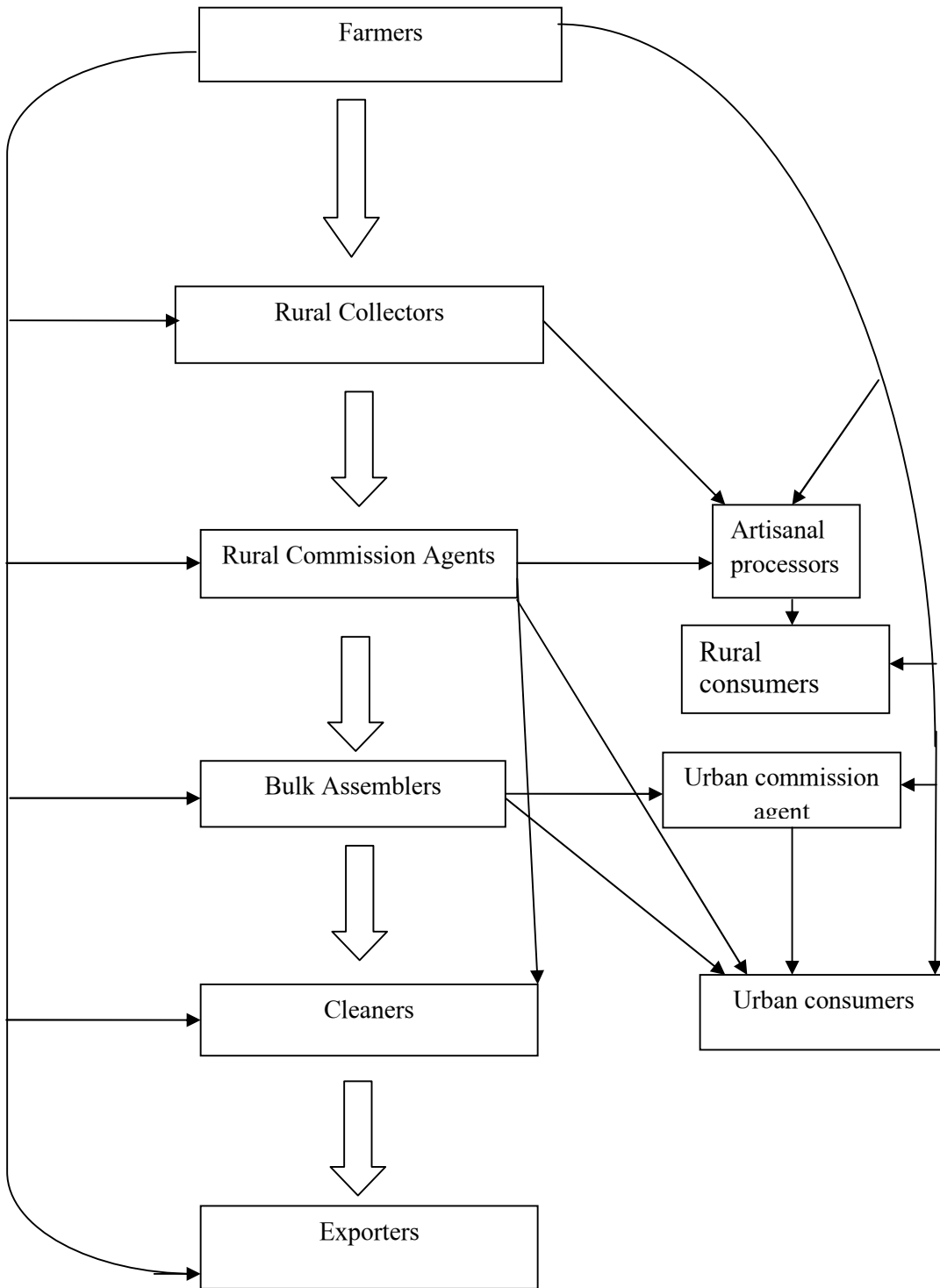


Figure 1: Sesame Marketing Channel in the Study Area

4.1.1 Age of Sesame Value Chain Actors

The age distribution of sesame farmers in Table 5a shows that, there was no farmer younger than twenty four years and older than sixty five years. Majority (66.7%) of the sesame farmers were between the ages of 24 and 53 years. Age is a factor that may enhance the adoption of innovation and as reported by Nwaiwu *et al.*, (2012) age is a determinant of human reasoning, decision making and responsibility. Younger and middle aged individuals are known to be active and innovative (Adeoye *et al.*, 2011). The result further shows that sesame producers had a mean age of 43.2years and standard deviation of 8.6. An average age of 43.2 indicated that the producers fall within the active age capable of undertaking all the mental and physical activities needed for producing sesame. Furthermore, they fall within the age that would enhance prompt and effective decision making. They are also expected to effectively utilize available resources (Nwaiwu *et al.*, 2012). The result also indicated that, the sesame farmers are still agile and strong to undertake and provide effective labour force required for sesame production. This result agrees with the findings of Tsoho and Salau (2012) who obtained a mean age of vegetable producers they studied as 43years; and concluded that age affects the adoption of innovation in traditional farming.

The age of sesame traders is an important socio-economic factor which affects the quantity of sesame traded. Accordingly, Muhammed (2012) reported that, in traditional societies of Nigeria, responsibilities are assigned according to age. The results in Table 5b indicates that sesame traders fell within a minimum and maximum ages of 25 and 70 years, with a mean and standard deviation of 44.70 and

8.5 respectively. The result implies that the traders were still within the active age and could put their best in undertaking the activities of sesame trading. Youth below the age of twenty five were found helping their parent and masters in the trading of the commodity as such were receiving training pending when they would be independent.

Age may affect the processor's quantity of sesame processed and sold. The results in Table 5c indicated that sesame processors fell within a minimum and maximum ages of 15 and 55 years, with a mean and standard deviation of 35.6 and 10.3. The result implies that the processors were still within their active age and could put their best in undertaking the rigorous activities of sesame processing, sound decision making and risk bearing as reported by Shuaib, (2014) that, actors within the active labour force could put their best in undertaking the rigorous activities of marketing.

The result in Table 5d indicates that sesame exporters fell within the minimum and maximum ages of 35 and 64 years, with a mean and standard deviation of 45 and 2.3. The result implies that the exporters were still within their active age and could put their best in undertaking the activities of sesame export and sound decision. Age is an important socio-economic factor which can affect the exporter's performance in terms of quantity sesame exported.

4.1.2 Gender Status of Sesame Value Chain Actors

Gender refers to the segregation of human beings according to their social roles as either male or female. It is better used than sex, as sex is a biological segregation. The result of the study in Table 5a reveals that all the sesame producers

were male. The trend over male dominance in the sesame production could be attributed to the fact that the sesame enterprise is a labor and time demanding, which the female could not possibly provide, considering their social roles with respect to domestic services in the study area. In some cases post-harvest operations such as winnowing are performed by the elderly women. This trend was earlier reported by Tiarniyu *et al* (2013) that sesame farming in Nigeria is a male dominated activity which was probably due to the fact that, male farmers have more access to family land than their female counterpart.

Table 5b indicates that all the traders (100%) studied were male. The study observed that, there was no female involved in the trading of the commodity in the study area. This is in line with the finding of Mustapha, (2012) who reported that, male participated fully in farming and trading activities whereas females engaged mostly in processing of farm produce in the North-Western Nigeria. This may also be connected to the fact that trading requires frequent travels and visits to several markets which is not usually allowed or accepted in Islam for married women in Hausa agrarian communities.

Gender status of the sesame processors are presented in Table 5c, and indicate that, all the processors were female. The study observes that, the female was involved with the artisanal sesame processing. This is line with the finding of FAO (2007) which reports that, male participated fully in trading activities whereas females engaged mostly in processing of farm produce in most North-West of Nigeria.

Table 5d indicates that, all the sesame exporters (100%) were male. This confirmed the finding of FAO (2007 as cited by Mustapha, 2012) which stated that, male dominated the trading or marketing activities of agricultural produce whereas females engaged mostly in processing of farm produce in most North-West of Nigeria

4.1.3 Marital Status of Sesame Value Chain Actors

Marital status refers to the status of an actor as single, married, divorced or widowed. It could be related to the household size and may likely affect the level of responsibility and labor availability to the actors. Result in Table 5a shows that 90% of the sesame farmers were married, while 10 % were single. This implies that majority of the producers have family responsibilities bestowed on them in terms of financial and social commitments. Additionally, there was possibility of early marriage among the producers and thus, they have large household size that could probably be available for farm work. This result agrees with Owombo *et al.*, (2012) and Adejobi and Babatunde (2011), who got 87% and 90% of vegetable farmers and farming household studied in Ondo state and Northern Nigeria respectively were married.

The results in Table 5b indicates that married traders constituted 88.9% while singles were 11.1%. It could be deduced that majority of the traders were married. This result corroborates with their mean age of over forty years and in a typical Northern Nigerian State, persons at such age must have been married. This result is in consonance with findings Mustapha (2012) who reported that 83% of the respondents for paddy rice trading were married and polygamous.

Similarly, results in Table 5c indicates that, 88.9% of the artisanal processors were married and 11.1% divorced. This shows that majority of the processors were married. This result corroborates with their mean age of thirty six years and in a typical northern Nigerian States, female at such ages must have been married. This result is slightly higher than the finding of Mustapha (2012) who reported that 83% of the respondents for paddy rice processors were married.

Further, results in Table 5d indicates that, all the sesame exporters (100%) were married. This result corroborates with their mean age of forty five years and in an ideal situation, persons at such age must have been married. This result is in consonance with the finding of Tiamiyu *et al* (2013) who reported that 100% of the respondents for sesame exports were married.

4.1.4 Household size of Sesame Value Chain Actors

Household size refers to the group of persons staying in the same compound and eating from the same pot including other dependents that may be outside. According to the National Population Commission (NPC, 2006), these individuals think of themselves as a unit. The result in Table 5a reveals that, 72% of the farmers had household sizes ranging between 1 and 14 people. However, the household size of between 20 to 24 persons was evident constituting about 13.3%. Availability of labor in undertaking economic activities is largely dependent on the size of the household (Musa, 2003). Large family size have been established among sesame farmers, this implies labor availability for farming activities and that the larger the household size the more the family labor and the lesser the cost of hired labor in the sesame production, this is in conformity with the position of Musa (2003) who

reported that, the higher the household size the more the family labor and the less the cost of hired labor in production and marketing activities.

The results in Table 5b reveals that majority of the sesame traders (80.6%) had house hold size of 1 to 14 persons. This indicated that, the sesame traders have relatively large number of household size probably for been married and polygamous. This result was higher than the national average of 5 according to NBS (2011) an implication of added burden to the national scarce resources; and as Ango *et al.*, (2011) posited, the reason behind large household size could be due to polygamous nature of Hausa people and their dependence on family as a source of labor (trade assistants).

Table 5c shows that majority (91.7%) of the processors had house hold size between 1 and 11. This indicated that, processors have relatively large number of household size when compared with national average of 5 (NBS, 2011). Ango *et al.*, (2011) posited, the reason behind large household size could be due to polygamous nature of Hausa people and their dependence on family as a source of labor.

Moreover, the results in Table 5d revealed that majority (83.3%) of the sesame exporters had household size between 1 and 6 persons, while 16,7 % of the exporters had up to 7 persons. This indicated that, the sesame exporters have small number of household size compared to other value chain actors, though is within the national average of 5 persons as posited by the (NBS, 2011).

4.1.5 Years of Education of Sesame Value Chain Actors

Educational status of the respondents is very important toward the strength or weakness in the managerial capability and adoption of innovation (Ayoola, 2010). The educational status of the sesame farmers in Table 5a shows that, 38.3 % of the sesame farmers had Qur'anic education while 36.7%, 16, 7% and 8.3% of the sesame farmers received primary, secondary and tertiary education respectively. It also helps the actor to easily understand and apply new practices and techniques in the production processes. The higher the years of education the faster the rate of apprehension and application of an innovation (Musa 2003). The result further indicates that, majority (61.7%) has attended one form of western education or the other. The implication of this result is that since the level of western education attainment of the sesame farmers was moderately high though primary level, they may apply and utilize new technologies properly.

Gani and Adeoti (2011) opined that educational level of market actor positively affects their level of market participation. The results in Table 5b shows that all the sesame traders have attained one type of education or the other, with majority (75%) having one form of western education or the other ranging from primary level (27.7%), secondary level (30.6%) and tertiary (16.7). whilst (25%) of the sesame traders attended Quranic education. The result implies that the level of western education attainment by the traders was relatively high though 17% had post secondary education. This may not be unconnected with the fact that, most of these marketers reside in the towns where the availability of educational institutions and infrastructure are readily available.

Results in Table 5c shows that, the processors have acquired one form of education or the other, fifty percent (50.0%) had western education, of which (33.3%) were at primary level while (16.7%) had secondary education. Fifty percent of the processors received Quranic education. The result implies that the level of western education attended by the processors was low, though about 16.7 % had secondary education. This may not be unconnected with the fact that, most of these processors reside in the rural areas and small towns where educational institutions and infrastructure were not available and as such the processing activities are still rudimentary. This result agrees with Adejobi and Babatunde (2011) who opined that operations in the markets were not necessarily tied to the level of education but how aggressive the marketers are in attending to customer interests.

The results in Table 5d shows that, all the sesame exporters (100%) have attained tertiary education. The result implies that the level of western education attainment by the sesame exporters was high. This may be due to the fact that, export as a downstream activities requires lot of technical know- how, which then requires high level of education especially that is an abroad transaction. More so, most of the exporters reside in cities where the availability of educational institutions and infrastructure are readily available. This result disagree with the findings of Adejobi and Babatunde (2011) who opined that operations in the markets were not necessarily tied to the level of education but how aggressive the marketers are in attending to customer interests.

4.1.6 Years of Experience of Sesame Value Chain Actors

The years of experience of the sesame value chain actor simply means the period spent by the actor in the sesame business. The results in Table 5a reveals that, the years of experience of sesame farmers ranges between 1 and 15 years with an average of 8.6 years. The standard deviation of 3.5 shows that, there was no wide variability among the producers in term of years of experience in sesame farming. Meaning that, the crop was newly introduced to the area compared to other indigenous arable crops. The average years of experience of 8.6 implies that the sesame producers have relatively moderate years of experience in sesame production, as such are expected to adopt new ideas to warrant efficient production.

Similarly results in Table 5b shows that the marketers had a range of years of experience between 3 and 14 years with a mean of 8 years. The standard deviation of 5.4 indicates that there was no much variation in terms of years of experience among the sesame traders. The mean value of 8 years of experience may be considered enough considering the recent awareness and promotion of the production of the crop in the State. The result is in consonance with the finding of Musa (2003) that experience traders are those with an average of 5 years of experience. According to this reasoning, the respondents have tendencies to adjust to changing economic conditions and adopt new ideas to increase profitability.

Table 7 reveals that, processors had a range of years of experience between 4 and 15 years with a mean of 9 years. The standard deviation of 3.7 indicated that there was no much variation in terms of years of experience among the sesame processors. The mean value of 9 years of experience may have been due to the

recent awareness and promotion of the production and marketing of the crop in the area. The result is in consonance with the finding of Musa (2003) that experience traders are those with 5 years and above average experience. According to this reasoning, the respondents are likely to adjust to changing economic conditions and adopt new ideas to increase profitability.

The years of experience of the sesame exporter simply means the period spent by the exporter in the business of export of this commodity. The result in Table 5d reveals that the exporters had a range of years of experience between 7 and 13 years with a mean of 10 years and standard deviation of 4.1. The mean value of 10 years of experience was relatively adequate to have considerable influence on marketing of the commodity, as it would allow the exporters to adjust to changing economic conditions and adapt new ideas to warrant efficient transaction (Damulak 2012). Additionally the result is consonance with the finding of Musa (2003) that experience traders are those with 5 years average experience.

4.1.7 Farm size of Sesame Farmers

This refers to the number of hectares devoted to sesame production. Farmers were categorized in to small, medium or large scale based on the number of hectares devoted to sesame farming and the tonnages of the product produced. The result in table 5 shows that, majority of the sesame farmers (56.7%) were small scale cultivating below 2 ha, sizeable (35%) were medium scale (2-5ha) and 8.3% were large scale (above 5ha). The results indicated that majority of the sesame grown in the area comes from small and medium farms which are the commonest form of Nigerian's agriculture as earlier reported by Chemonics (2002) and Musa

(2003) and that small and medium scale farm holding account for about 95% of the total crop output in Nigeria. The implication of this finding is that, achievement of the sustainable development goals in terms of food self sufficiency and promotion of non oil export would be difficult.

4.1.8 Sesame Marketing Channel

The sesame marketing channel (Fig. 1) depict the pathway through which the sesame passes as value are added along the chain and it comprises of participants performing different value addition functions from production, marketing, cleaning and exporting. The channel (Fig. 1) composed of producers, rural collector, rural market commission agents, artisanal processors, rural consumers, bulk assemblers, urban commission agents, urban consumers, cleaners and the exporters.

Figure1 further depicts that, sesame farmers mainly supply the commodity to the rural collectors and rural commission agents, but partly to bulk assemblers and to the exporters under contract farming arrangement in which the exporters provide seed and capital for production while farmers pay back with product at harvest. Similarly, farmers supply in part to artisanal processors, rural consumers, urban commission agent and urban consumers.

The rural collectors mainly supply the sesame to rural commission agents who sell the commodity to bulk assemblers and partly to artisanal processors who in turn supply the rural consumers, bulk assemblers mainly supplied sesame to cleaners and partly to urban commission agents which in turn supply to urban

consumers. The cleaners supply all the sesame to the exporters who in turn ship the cleaned sesame to oversea markets like Japan, Middle East and China.

4.2 INFLUENCE OF VALUE CHAIN ACTOR'S SOCIO-ECONOMIC CHARACTERISTICS ON THE OUTPUT OF SESAME

Socio-economic characteristics of value chain actors do affect the level of output of the sesame produce. Musa (2003) and Kyei *et al.*, (2011) examined the influence of farmer's socio-economic characteristics on the output of cowpea and vegetable obtained at the end of a production cycle. Results of the influence of socio-economic variables of the actors on the output of sesame was obtained using regression and are presented in Tables 6a, 6b, 6c and 6d.

Table 6a: Influence of socio-economic Characteristics of Farmers on Output of Sesame Produced

Variable	Coefficient	T-ratio	P-value
Constant	-564.318	-1.445	.154 ^{Ns}
Age (X ₁)	-2.829	-.327	.745 ^{Ns}
Marital status (X ₂)	-16.875	-.153	.879 ^{Ns}
Household size (X ₃)	25.468	1.857	.073*
Years of education (X ₄)	240.105	3.412	.001***
Years of experience (X ₅)	36.840	1.964	.055*
Farm size put to sesame production(X ₆)	35.578	2.525	.015**
R²	0.618		
R-Square adjusted	0.575		
F- Value	14.310***		

***= (P< .001), **= (p< .05), *= (p< .01) and Ns= Not significant

Source: Field Survey, 2013

Table 6b: Influence of Socio-economic Characteristics of Traders on Quantity of Sesame Traded

Variable	Coefficient	T-ratio	P-value
Constant	-203.442	-.1830	.077*
Age (X ₁)	6.110	2.447	.020**
Marital status (X ₂)	-9.143	-.336	.784 ^{Ns}
Household size(X ₃)	12.701	3.374	.018**
Years of education (X ₄)	43.320	2.398	.023**
Years in of experience (X ₅)	40.998	1.373	.095*
R²	0.694		
R-Square adjusted	0.577		
F-Value	2.502*		

***= (P< .001), **= (p< .05), *= (p< .01) and Ns= Not significant

Source: Field Survey, 2013

Table 6c: Influence of Socio-economic Characteristics of Processors and Quantity of Sesame Processed

Variable	Coefficient	T-ratio	P-value
Constant	332.139	.272	.791 ^{Ns}
Age (X ₁)	-2.993	-.301	.769 ^{Ns}
Marital status (X ₂)	-4.164	1.658	.894 ^{Ns}
Household size (X ₃)	99.910	1.658	.126 ^{Ns}
Years of education (X ₄)	356.249	3.243	.008***
Years of experience (X ₅)	109.273	2.508	.029**
R²	0.516		
R-Square adjusted	0.340		
F-Value	2.932*		

*= (P< 0.01), **= (P< 0.05), ***= (P< .001), Ns= Not significant

Source: Field Survey, 2014

Table 6d: Influence of Exporter's Socio-economic Characteristics and Quantity of Sesame Exported

Variable	Coefficient	T-ratio	P-value
Constant	206.989	47.412	.013**
Age (X ₁)	43.359	66.819	.010***
Household size (X ₂)	-115.294	-14.657	.043**
Level of education (X ₃)	120.471	17.717	.036**
R²	0.728		
R-square adjusted	0.695		
F-value	2.923*		

***= (P< .001), **= (p< .05), *= (p< .01)

Source: Field Survey, 2014

Table 6a indicates that 61.8% of the variation in the output of sesame was influenced by the socio-economic variables of the farmer included in the model. The intercepts (constant) amounting to -564.318 was the amount of sesame that could be produced in Kilograms without considering the socio-economic variables of the farmers. The F-value of 14.310 was significant at 1% level, meaning that the variables included in the model have jointly explained the variation of output observed in the output of the crop.

The results in Table 6b shows that, 69.4% of the variation in the quantities of sesame bought and sold was influenced by the socio-economic variables of the traders included in the model. The intercepts (constants) of -203.442 was negative but significant at 10% level. By implication this amount 203.442kg of sesame could either be bought or sold without considering any of the socio economic variables of the traders included in the model.

Similarly, the result in Table 6c indicates that, about 51.6% of the variation in the quantities of sesame processed was influenced by the socio-economic variables included in the model. The intercept (332.139) was positive but not

significant. This reveals that, this amount of sesame could be processed without considering any of the socio economic variables included in the model.

The result in Table 6d indicates that about 72.8% of the variations in the quantity of sesame exported were influenced by the socio-economic variables of the exporters included in the model. The intercepts (constant) of 206.909 was positive and significant at 5% level. This implied that, this amount of sesame could be exported without considering any of the socio economic variables of the exporter included in the model. The F-value (2.923) which was significant at 5% indicated the joint significant effect of the independent variable. The socio-economic variables of the actors were age, marital status, household size, years of education, years of experience and farm size.

4.2.1 Age of Value Chain Actors and Output of Sesame

The influence of the farmer's age on the output of sesame was presented in Table 6a. The regression coefficient (-2.829) with respect to age was negative and not statistically significant at any of the probability level, meaning that, age did not explained the variation in the level of output of sesame. The negative sign indicates that younger farmers produce more sesame than the older ones. This result could be related to the fact that, majority of the sesame farmers were in their active ages to undertake the rigorous activities and adopt new practices needed in the production of this crop, as earlier posited by Adeoye *et al* (2011).

Influence of the age of sesame traders on the quantities of sesame traded was presented in Table 6b. The regression coefficient with respect to age (6.110) was positive and significant at the probability of 5% level. The implication of the

result is that, age of the trader has a significant influence on the quantity of sesame traded. It was earlier reported by (Muhammed, 2012) that marketer's age is important for taking marketing risks and uncertainties.

Table 6c presents the regression coefficient of -2.993 for the age of processors, it was found to be negative and insignificant at either of the probability level. The implication of the result is that, processor's age had no influence on the quantity of sesame processed.

The influence of the age of an exporter on the quantity of sesame exported was presented in Table 6d. The regression coefficient (43.359) with respect to age was positive and statistically significant at 1% level of probability. The implication of the result is that, the exporters with high number of years are likely to export more of the commodity

4.2.2 Marital Status of the Value Chain Actors and Output Sesame

The influence of marital status on the sesame producers was presented in Table 6a. The results indicated that the coefficient of marital status (-16.875) was negatively signed and statistically not significant. The implication of this result is that, marital status does not influence variation in the output of sesame produced. It is very obvious that married individuals have the responsibility to cater for the need of their families and may be the reason for spending less on the sesame production hence affects the output. Olarinde *et al.*, (2008) reported that one of the most important factors which determine technical efficiency and production among beekeepers in Oyo State, Nigeria was their marital status.

Results in Table 6b indicates that, the coefficients for marital status (-9.143) was negative and not significant at either of the probability level. This implied that, marital status has no influence on the amount of sesame traded, this may be due to the fact that, married individuals have the responsibility to cater for the need of their families and may be the reason for spending less on the sesame trading.

The result in Table 6c indicates that, the regression coefficient (-4.164) for married processors was negative and insignificant. By implication, marital status has no influence on the quantity of sesame processed because there was difference in the quantity processed between the married and the divorced women.

4.2.3 Household size of Sesame Value Chain Actors and Output of Sesame

Household size is one of the socio-economic variables of the sesame value chain actor that may influence the output of sesame dealt on. The result in Table 6a reveals that the coefficient (25.468) of household size is positive and statistically significant at 10% level. This implied that, the more the household size, the more the output of sesame produced. Sesame farmers who have high household size produce higher output of the crop. This could be attributed to the fact that, the more the household size the more the farmer is propelled to produce more of the output of the crop in order to meet the need of their family members

The result in Table 6b revealed that the coefficient (12.701) of household size was positive and statistically significant at 5% level. This implied that, the more the household size, the more the quantity of sesame traded. Traders with high household size traded higher quantity of the crop. This could be attributed to the fact that, some members of the household especially those below the age of 24

helped in the marketing as assistants who are receiving training from the elders more so the larger the household size the more the trader is compelled to trade more of the commodity all thing being equal to meet the need of the family members.

Table 6c shows that the coefficient (99.910) of household size was positive but statistically insignificant. This implied that, with respect to artisanal processing of sesame, household size had no influence on the quantity of sesame processed.

The influence of household size on the quantity of sesame exported was presented in Table 6d. The result indicated that the regression coefficient (-115.294) for household size of exporters was negative but significant at 5% level of probability. This implied that, although the household size of these actors had significant influence but had an inverse relationship. Meaning that the higher the number of household size the less the quantity of the commodity exported. This may not be unconnected with the high spending on the family members which negatively affect the investment in the enterprises.

4.2.4 Years of Education of Value Chain Actors and Output of Sesame

The influence of years of education acquired by the farmers on the outputs of sesame is presented in Table 6a. The results revealed that the coefficient of years of education (240.105) was positive and statistically significant at 1%. This implied that, years of education influences the level of sesame output that is to say the higher the years of education the higher the level of sesame output produced. Education is expected to allow for easy adoption of new technologies and innovation of farming. The result agrees with the findings of Kyei, *et al.*, (2011)

who asserted that increasing the level of western education increases the level of productivity and efficiency among farmers.

The influence of years of education attended by the sesame trader and the quantity of this commodity traded was presented in Table 6b. The result shows that the coefficient of years of education (43.320) was positive and significant at 5% level. According to this reasoning, traders with high years of education traded higher quantity of sesame than those with less years of education. This in consonance with the position of Aminu and Musa, (2007) who reported that formal education aids the marketers in adopting improved marketing strategies.

Table 6c presents the influence of years of education on the quantities of the commodity processed. The result shows that, the coefficient (356.249) of years of education was positive and significant at 1% level, meaning that, processors who have high years of education processed larger quantities of sesame than those who have not.

The influence of years of education of the exporters of sesame and the quantities of sesame exported was presented in Table 6d. The results revealed that the coefficient (120.471) of western education was positive and significant at 5% level Meaning that, quantity of sesame exported are significantly influence by the exporter's educational status. This result is in consonance with the finding of Aminu *et al.*, (2009) who posited that formal education aid marketers in adopting improved marketing strategies.

4.2.5 Years of Experience of Value Chain Actors and Output of Sesame

The result in Table 6a indicates that, the regression coefficient of years of experience in sesame production was positive (36.840) and statistically significant at 10%, it thus implies that, sesame output was influence by years of experience in its production because the longer a person stays on a particular job the likely of that person to become an expert Mustapha (2012) and hence affect the level of productivity

Result in Table 6b shows that, the coefficient (40.998) with respect years of experience was positive and significant at the probability level of 10%. The result implied that, those marketers with higher number of years of experience traded higher quantities of sesame than those with low years of experience as the years of experience were found to significantly influence the quantity of sesame traded. This result did not differ from *apriori* expectation for the fact that traders with high years of trading experience should be articulate in taking decision and risk bearing. Increase in years of experience positively affects the productivity and the output of a marketer (Adeoye, 2011). Similarly, the result agrees with the finding of Mustapha (2012) who opined that, the longer a person stays on a particular job the propensity of that person to become an expert and hence affect the level of productivity.

The years of experience in processing of sesame was presented in Table 6c. The regression coefficient (109.273) with respect to years of experience was positive and significant at the probability level of 5%. The result indicated that those processors with higher number of years of experience processed higher

quantity of sesame than those with low years of experience. This result is not different from *ap riori* expectation.

Table 6d shows the result of regression of years of experience and quantity of sesame exported. The regression coefficients (38.892) with respect to years of experience was positive and significant at the probability level of 10% . The result indicated that those exporters with high years of experience bought and exported higher quantity of sesame than those with low years of experience. This result is in consonance with *ap riori* expectation for the fact that exporters with high years of sesame export experience should be more articulate in taking decision and risk bearing considering their level of education. Increase in years of experience positively affects the productivity and the output of an actor (Adeoye, 2011).

4.2.6 Farm Size of Producers and Output of Sesame

The larger the farm size devoted to an enterprise *ceteris paribus* the higher the output of the crop. Small size farms form the majority of the sesame farms in the study area. The results in Table 9 revealed that, the coefficient (35.578) of farm size was positive and statistically significant at 5% level. The result implies that, the more farm size devoted to sesame the more the sesame output produced. Majority of the sesame produced in the study area comes from smaller farms which according to Chemonics (2002) and Tihamiyu *et al* (2013) are the commonest sesame farm in Nigeria.

4.3 SESAME VALUE CHAIN GOVERNANCE

Governance entails power (in terms of price) relationship and the pattern of information sharing among the value chain actors. Damulak, (2012) observed that,

power relations are crucial in value chain, the power relations between different actors determine how economic gains and risks are distributed among chain actors and the extent to which dominant firms are able to set and enforce standards with the aim of raising entry barriers for competitors and to achieve market foreclosure. Governance of value chains implied that, there are key actors in the chain who take responsibility for the inter-firm division of labour, and for the capacities of particular participants to upgrade their activities.

Figure 2: Matrix of Governance by Sesame VCAs

Actors	Variables		
	Price control	Price bargain	Market information
Producers	9.4 (13)	24.6 (34)	18.1 (25)
Traders	59.4 (82)	54.3 (75)	65.2 (90)
Processors	8.0 (11)	6.5 (9)	5.8 (8)
Exporters	23.2 (32)	14.5(20)	10.9 (15)

Values in parenthesis are frequencies

Source: Field Survey, 2013

Figure 2 presents the matrix mapping of VCAs responses to the variables of governance that is price control, price bargain and information control. The result shows that, sesame prices along the chain are being controlled by traders (59.4%) as depicted in green color. Sesame traders exert control over the price of sesame along its value chain, this may be for the fact that they collude and set the price for the sesame in the markets and for which the farmers have to accept probably due to the non development of the sesame value chain. This is consonance with the finding of

Tiamiyu *et al.*, (2013) that reported farmers as price takers, since they do not control the price of the sesame.

Ability to bargain price is an important factor in agricultural commodity marketing and in determining value chain governance. It connotes the stake a marketing actor has in the price formation. Figure 2 further shows that, sesame traders (54.3%) bargained higher than other actors in sesame value chain as highlighted in green color. This may be due to the fact that sesame traders make use of their ability and network to source the commodity irrespective of location and time sells it to the other actors in the downstream; cleaners and the export companies. This finding agrees with the report of Damulak, (2012) that yam farmers in Pan and Eggon collects what was offered to them by the yam dealers as the proceeds of sale of their commodity. According to this reasoning, sesame and yam farmer do not bargain the price of the commodity but take the price offered to them by the trader. This is not surprising because these actors performed their activities in the downstream level of the value chain and at times are in traders associations.

Additionally, the result reveals that, market information as a variable of value chain governance was found to be controlled by the traders, This finding was not surprising because of what Gerrefi, (2005) described as hierarchical relationship existing in a value chain governance where the buyers take hold of all operations carried out due to the low competence of the suppliers not just at production level but in all other areas. Moreover, for the fact that the traders link up with exporters

as multinational companies that tend to collude and dictate the sesame marketing activities.

Additionally, sesame exporters through the traders set the price of sesame along the chain. This finding may not be surprising because the sesame exporting companies set the buying price of the commodity from the traders which in turn affect the price of sesame both at the upstream and the downstream sectors of the value chain. This finding is not far with *ap riori* expectation for the fact that, exporters through the traders came out with specifications and other information as regards the sesame marketing each season and from that every other actor in the chain based and set transactions.

4.4 PROFITABILITY ANALYSIS OF SESAME VALUE CHAIN ACTORS

The profitability of sesame value chain in the upstream was determined using net farm income analysis for production, which was calculated from the difference between gross income/revenue and total cost (summation of total variable and fixed cost of production). The variable cost items include seed, fertilizer, pesticides, labor, sacks, handling and transport cost while the fixed cost include rent payment on farmland and depreciation on fixed assets like sprayer and hoe. The revenue that accrued from the sales of sesame was obtained after calculating the output per hectare and the average prices of the commodity. Both costs and revenues were calculated on per hectare basis. The cost, returns and profitability ratios of sesame value chain are presented in Table 7a, 7b, 7c and 7d.

Table 7a: Estimated Cost and Return of Sesame Production/ha

Input	Unit price (₦)	Quantity (unit/ha)	Amount (₦)	% of TVC/ TFC	% of TC
Seed (Kg)	250	9.0	2,250	2.42	2.17
Fertilizer (Kg)	5,000	4.6	23,000	24.77	22.23
Herbicide (L)	1,200	2.2	2,640	2.84	2.55
Labor (man day)	800	80.3	64,240	69.18	62.09
Sack (No)	80	9.0	720	0.77	0.70
Total variable cost			92,850	100	89.75
Fixed costs					
Rent value of farmland (₦)			7,000	66.04	6.77
Depreciation on fixed inputs (₦)			3,600	33.96	3.48
Total fixed cost			10,600	100	10.25
Total cost			103,450		100
Total revenue	285	534.6	152,361		
NFI			48,911		
RNI			0.47		
GR			0.68		
OP			0.61		

Source: Field Survey, 2013

Table 7b: Cost, Return and Marketing margin in (₦/ton) of Sesame Traded

Marketing input	Unit price (₦)	Quantity	Amount (₦)	% of TVC/ TFC	% of TC
Purchase price (₦/ton)	283,700	1.0	283,700	98.44	98.38
Sacks (unit)	70	9.0	630	0.22	0.22
Handling (₦/ton)	720	1.0	720	0.25	0.25
Commission charges (₦/ton)	900	1.0	900	0.31	0.31
Transport cost (₦/ton)	2,250	1.0	2,250	0.78	0.78
Total variable cost (₦/ton)			288,200	100	
Fixed costs					
Tax (₦/ton)	180	1.0	180	100	0.06
Total marketing cost (₦/ton)			288,380		100
Sales value (₦/ton)	360,000	1.0	360,000		
Marketing margin (₦/ton)			71,800		
RNI			0.25		

Source: Field Survey, 2013

Table 7c: Cost, Return and Margin per ton of Artisanal Sesame Processing

Budget item	Unit price (₦)	Quantity	Amount (₦)	%TVC /TFC	%TC
Purchase price per ton (₦/ton)	320000	1.0	320000	70.33	98.09
Handling and transport (₦/ton)	10000	1.0	10000	2.20	0.16
Processing					
Cleaning and de-hulling (₦/kg)	25000	1.0	25000	5.49	5.31
Frying and drying (₦/kg)	10000	1.0	10000	2.20	2.13
Pasting with sugar (₦/kg)	90000	1.0	90000	19.78	19.15
Total variable cost			455000	100	
Fixed cost					
Depreciation on fixed inputs (₦/kg)	15000	1.0	15000		3.19
Total fixed cost			15000		
Total cost			470000		100
Total revenue (₦/ton)	550000	1.0	550000		
Processing margin			80000		

Source: Field survey, 2014

Table 7d: Cost, Returns and Margins per ton of Sesame Exported

Budget item	Unit price (₦)	Quantity	Amount (₦)	% of TVC/ TFC	% of TC
Price per ton (₦/ton)	400,000	1.0	400,000	96.79	96.44
Transport charges to port (₦/Kg)	10,000	1.0	10,000	2.41	2.41
Freight and forwarding charges (₦/ton)	2,250	1.0	2,250	0.54	0.54
Documentation (₦/ton)	500	1.0	500	0.13	0.12
Inspection (₦/ton)	500	1.0	500	0.13	0.12
Total variable cost			413,250	100	
Fixed cost					
Depreciation on warehouses (₦/ton)	250	1.0	250	16.67	0.06
Tax/other charges (₦/ton)	750	1.0	750	50.00	0.18
Port charges/levy (₦/ton)	500	1.0	500	33.33	0.12
Total fixed cost			1,500	100	
Total cost			414,750		100
Total revenue (₦/ton)	445,000	1.0	445,000		
Export margin (₦/ton)			31,750		

Source: Field Survey, 2014

4.4.1 Sesame Production

The result in Table 7a reveals that, average output of 534.6 kilograms of sesame was obtained per hectare, while ₦250 was the average price per kilogram of sesame. The gross income was ₦ 152, 361/ha. Total variable cost of sesame production was ₦92, 850 (89.75%) and total fixed costs was ₦10, 600 (10.25%) giving a total cost of ₦103, 450 per hectare. Net income per hectare was ₦59, 511. This value was greater than ₦9, 190 but less than ₦82, 367.9 reported by Tihamiyu *et al.*, (2013) and Sidi Iet al, (2014) as net income for sesame production in Nigeria. The difference in the values may be due time and the inflationary condition. Since the total revenue was greater than the total variable cost, the value of gross margin was positive and thus implied that, the sesame production in the study area was profitable. The result agreed with report of Tihamiyu *et al.*, (2013) and Sidi *et al.*, (2014) who concluded that production of sesame was profitable in Nigeria. The rate of return on investment was 0.47; this implied that for every naira invested in the sesame production 47 kobo was realized as profit. This figure is greater than 0.15 obtained by Tihamiyu *et al.*, (2013) and lower than 3.1 reported by sidi *et al.*, (2014) as return on Naira invested for sesame production in Nigeria and may have follow the same pattern with the value of net income. The result further reveals Gross Ratio (GR) of 0.68 for sesame production. The ratio was less than unity; a ratio of less than unity is preferred for any farm business. Olukosi and Erhabor (2008) posited that the lower the ratio the higher the profit.

4.4.2 Sesame Trading

The profitability analysis of sesame traded was determined using marketing margin analysis. It was calculated from the difference between gross income/revenue and total marketing cost. The total marketing cost items include sesame seed, sacks, handling charges, commission charges, transport charges, levy and tax while the gross return was calculated from the average quantity traded and the average price of the commodity. Both costs and revenues were calculated on per ton basis.

The results in Table 7b shows an average purchase price of ₦283, 700 per ton of sesame. Total variable cost of sesame trading was ₦288, 200/ton and total marketing cost was ₦288, 380 per ton. Total sales value of sesame was ₦360, 000 per ton; therefore marketing margin was ₦71, 800 per ton. Since the total selling price was greater than the total marketing cost, then value of marketing margin was positive and thus implied that, the sesame trading was considered profitable. The result agrees with Tiamiyu *et al.*, (2013) who reported N26, 242/ton as gross margin for sesame trading and posited that sesame trading was profitable in Nigeria. The return per Naira invested in sesame trading was 0.25 meaning that, for every Naira invested in sesame trading 25 Kobo was returned as profit. Hence this was found to be cost effective. The value of RNI (0.25) was slightly higher than the value 0.17 reported by Tiamiyu *et al.*, (2013) for sesame trading in Nigeria. This may be due to difference in time of the conduct of the researches and the situation of the economy.

4.4.3 Sesame Processing

The profitability analysis of processed sesame was determined using processing margin analysis. Both costs and revenues were calculated on per 1000kg (ton) basis. The result in Table 7c revealed that, artisanal processor's average purchase price was ₦320, 000/ton, this price is comparatively lower than the sales value of the traders because the artisanal processor got most of their supplies from farmers, rural collectors and commission agent but seldom from the traders. Total variable cost of artisanal processing was ₦455, 000/ton representing (96.81%) and total fixed costs from the value of depreciating the fixed inputs like the frying pan, sieve, tray, spray mats, frying sculp and *Kantu* mould was ₦15000/ton representing (3.19%) giving a total cost of ₦470, 000/ton. The total revenue was ₦550, 000/ton. The processing margin was ₦80, 000. This processing margin was the highest among the actors in value chain because it is the commonest processed form of the product consumed locally in the area and the enterprises requirements in terms of machines facilities is limited.

4.4.4 Sesame Export

The profitability analysis of sesame exporters was determined using export margin which was calculated from the difference between gross income/revenue and total marketing cost. The marketing cost items include, cost of cleaned sesame, transport charges, documentation, inspection charges, port/levy charges, freight and forwarding charges. Both cost and revenues were calculated on per ton basis.

Result in Table 7d revealed that, Total variable cost was ₦413, 250 per ton. The total fixed cost was ₦1, 500 thus giving a total cost of ₦414, 750 per ton of sesame exported. The total sales value of exported sesame was ₦445, 000/ton, therefore the gross exporting margin was ₦31, 750. Since the total resale price was greater than the total exporting cost, the value of export margin was positive and thus implied that, the sesame export was profitable. The result agrees with the finding of Achike and Anzaku (2010) and Tihamiyu *et al.*, (2013) who have found that sesame export was profitable in Nigeria.

4.4.5 Value Added along the Sesame Value Chain

Value was added to sesame as it moves from production to export, Value added by each actor was obtained from the analysis of cost and return of production, trading, processing and export of the commodity.

Table 8: Value added per ton along the Sesame Value Chain

Actors	Producers	Traders	Processors	Exporters
Sesame form	Row seed	Row seed	Snacks	Cleaned seed
Purchase price (₦)	250,000	283,700	470, 000	400, 000
Value (₦)	285,000	360, 000	550, 000	445, 000
Value added (₦)	35,000	76, 300	80, 000	45, 000

Source: Field Survey, 2014

Result in Table 8 shows that value increases as sesame move along the value chain. Value addition at producer's level was found to be ₦35, 000/ton. However as the commodity pass to the hand of trader the value added was ₦76, 300/ton. This may not be surprising because the traders are in categories and the commodity

passed through with each adding value and exercised possession for some time before it ultimately got to the hand of cleaners. The value added by sesame artisanal processors was ₦80, 000/ton, while exporters had ₦45, 000/ton as value addition. The result depicted the highest added value was in respect of sesame artisanal processing. In other word the highest value addition along the sesame value was at the processing stage The result agreed with the finding of Adeoye *et al.*, (2013) and Yahaya (2015) who reported the highest value addition in processing stage of plantain and chili pepper value chain in south west and Kano state of Nigeria.

4.5 SESAME PHYSICAL CHARACTERISTICS AND ITS PREFERENCE BY VALUE CHAIN ACTORS

Sesame attributes studied comprises of seed variety (local or improve), seed size (small or big), seed color (white or brown), seed source (location) and seed composition with foreign materials. These characteristics affect its choices and prices among the sesame value chain. Results of the value chain actor’s preferences are presented in Tables 9a, 9b and 9c.

Table 9a: Farmer’s Preference to Sesame Seed Physical Characteristics for Planting

Sesame attributes	Frequency	Percentage
Seed size		
Small	11	18.3
Big	49	81.7
Seed color		
White	52	86.7
Brown	8	13.3
Variety		
Local	13	21.7
Improved	47	79.3

Source: Field survey, 2013

Table 9b: Trader's Preferences to Sesame Physical Characteristics

Sesame attributes	Frequency	Percentage
Seed size		
Small	11	30.6
Big	25	69.4
Seed color		
White	30	83.3
Brown	6	16.7
Seed source		
<i>Dan Kano</i>	20	55.6
<i>Dan Maiduguri</i>	9	25
<i>Dan Lafiya</i>	7	19.4

Source: Field Survey, 2013

Table 9c: Processor's Preferences to Sesame Physical Characteristics

Sesame attributes	Frequency	Percentage
Seed size		
Small	25	69.44
Big	11	30.56
Seed color		
White	30	83.3
Brown	6	16.7
Seed composition		
Below 5% foreign bodies	28	77.7
Above 5% foreign bodies	8	22.3

Source: Field Survey, 2014

4.5.1 Sesame Value Chain Actor's Preference

Results in Table 9a shows that 82% of the sesame farmers preferred big sized sesame seed for easy sale, while 18% had preference for small size seed. White colored 87% were preferred by the farmers compared to brown with only 13%. This was due to white seed are preferred by traders (easy marketing). In terms of variety, majority of the farmers (79%) preferred improved to local cultivar because comparatively it yields higher than the local variety.

The result in Table 9b shows that, 69% of the traders prefer big sized seed as it sales better in the market, while 31% of goes for small size seed. 83% of the traders prefer white sesame compared to 17% that prefer brown the reason to this is that white sesame cleaned earlier than brown and hence this entails added cost to the cleaner. Similarly, 56% of the traders prefer *Dan Kano* by location than the sesame from other location. The reason for preference of *Dan Kano* may be due to lower transportation charges from location of production as *Dan Kano* is comparatively closer to Dawanau market than the *Dan Maiduguri* or *Dan Lafiya*.

Processor's preference results in Table 9c shows that, 69.4% of processors prefer small sized seed because it tends to be more in quantity per unit of measure hence more surface area and volume for snacks making, while 31% had preference for big size. 83.3% preferred white colored and 78% had preference for sesame with below 5% foreign bodies. The reason of the processors for white seed and those below 5% foreign bodies by composition is that, it is more attractive to consumers and also health wise the sesame with no sand cannot cause appendicitis.

4.5.2 Hedonic Regression of Sesame Value chain Actors

Result of Estimated Hedonic Regression compared the prices of sesame with its physical characteristics, the price as the dependent variable while sesame physical characteristics as independent variables. Hedonic regression results of the actors are presented in Tables 10a, 10b and 10c.

Table 10a: Hedonic Regression of Sesame Characteristics affecting Farmers Choice

Variable	Coefficient	T-ratio	P-value
Constant	288.519	14.01	.000
Sesame seed size (X₁)			
Small	6.643	1.75	.078*
Variety of sesame (X₂)			
Local	18.217	8.16	.004**
Sesame color (X₃)			
Brown	-21.972	-.1230	.170 ^{Ns}

R² = 0.567; R² Adjusted = 0.406, ** (P<.01), * (P<.05), Ns = Not significant

Source: Field survey, 2013

Table 10b: Hedonic Regression of Sesame Characteristics affecting Trader's Choice

R² = 0.587; R² adjusted = 0.438, * = (p< .01), *** = (p< .001), Ns = Not significant

Variable	Coefficient	t-ratio	p-value
Constant	1514.467	3.936	.000***
Sesame seed size (X₁)			
Small	-40.473	-2.180	.337 ^{Ns}
Sesame color (X₂)			
Brown	8.281	1.464	.053*
Seed source (X₃)			
<i>Dan Maiduguri</i>	23.67	1.974	.081*
<i>Dan Lafiya</i>	.368	.257	.179 ^{Ns}

Source: Field Survey, 2013

Table 10c: Hedonic Regression of Sesame Characteristics for Processor's choice

Variable	Coefficient	t-ratio	p-value
Constant	378.569	21.36	.000***
Sesame seed size (X₁)			
Big	9.453	2.579	.086*
Sesame color (X₂)			
Brown	-34.128	-.337	.271 ^{Ns}
Seed composition (X₃)			
Below 5% foreign body	10.063	3.965	.007**

R² = 0.614; R² = square adjusted 0.572 * = (P< .05), Ns = Not significant

Source: Field Survey, 2014

Result of Estimated Hedonic Regression that compared the prices of sesame is presented in Table 10a with price as the dependent variable while sesame physical characteristics as independent variables. The size of the seed was entered with two variables dummies (Big and small size) but big was the reference group: color was also entered as white and brown with white as the reference group. Variety was entered as improved or local with improved as the reference group.

The result shows an R^2 of 56.7%, indicating that 56.7% of the variation in the price of sesame seed was explained by the explanatory variables included in the model. Big size sesame seed was compared with small size seed, the result shows that, small seed was found to be statistically significant at probability ($P < 0.01$). This implied that, there was a different in prices between the big and small seed hence the prices of the big size seed was higher than the small size seed which may be due to high demand of the commodity and especially during planting, when the seed are scarce. Further the result indicated that, local variety was also found to be statistically significant at ($P < 0.05$). This means that, improved variety was sold at higher price than the local variety which is cheaper this may be due to the improved variety out yielded the local type as confirmed by the farmers. Additional reasons to this may not be unconnected with the fact that improved seed were accessed from certified seed companies who sold at a higher price compared to local seed obtainable in the open market. Brown colored seed was statistically insignificant, this means that the farmers were indifferent to the color of the seed, though majority prefer white colored but due to scarcity at the time of planting, farmers made use of

what was available to them, hence this confirmed their seed source from market or saved from the previous harvest.

Estimation of Hedonic Regression of sesame trading compared the prices of sesame as the dependent variable while sesame physical characteristics as independent variables. The size of the seed was entered with two variables dummies (Big and small size) big was the reference group: color was also entered as white and brown with white as the reference group. Seed sources was entered as *Dan Kano*, *Dan Maiduguri* or *Dan Lafiya* with *Dan Kano* as the reference group.

An Estimation of Hedonic Regression result in Table 10b shows that 58.7% ($R^2 = 0.587$) of the variation in the price of sesame was explained by the explanatory variables included in the model. These variables were the seed size, color, as well as seed source. The remaining 42.3% of the variation was due to error distribution. Small size sesame seed was found to be statistically insignificant. This implied that, traders were indifferent to the seed size of sesame as such purchase seed regardless of the seed size because of bulking and wholesaling activities. The result further shows that, brown seed was found to be statistically significant at probability of 10%, this implied that, prices of the white seed was higher than the brown seed as such the traders discounted the brown seed and paid premium to the white sesame seed. Similarly comparison of the sesame seed in terms of its source revealed that, *Dan Maiduguri* was statistically significant at probability of 10% while *Dan Lafiya* was not. The implication of this result is that *Dan Kano* was sold at a higher price than the *Dan Maiduguri* but *Dan Kano* and *Dan Lafiya* were found sold the same price. Meaning that, the traders were ready to discount *Dan Maiduguri* but pay premium to *Dan Kano* and *Dan Lafiya*.

Result of Estimated Hedonic Regression of processors compared the prices of sesame with physical characteristics, sesame price as the dependent variable while sesame physical characteristics as the independent variables. The size of the seed was entered with two variables dummies (Big and small size) but small was the reference group: color was also entered as white and brown with white as the reference group. Seed composition was entered as composition below 5% foreign bodies and composition above 5% foreign bodies with latter as the reference group.

The result in Table 10c shows that 61.4% of the variation in the price of sesame seed was explained by the explanatory variables included in the model. These variables were the seed size, seed color and seed composition with dirt. The remaining 38.6% was not explained by the included variables, meaning that sesame physical characteristics had influence on the prices processor's paid for the commodity. Big size sesame seed was compared with small size seed, the result shows that, big size seed was found to be statistically significant at probability ($P < 0.05$). This implied that, prices of the small size seed was lower than the big size seed which may be due to the fact that small seed weigh heavier because of volume than the big seed as adduced by processors. Seed color was not found significant in explaining the price of sesame by the processors, this means that processor were indifferent to color when paying for the sesame price.

Sesame seed composition with below 5% level of dirt inclusion (10.063) was found to be positive and statistically significant at ($p < 0.01$). By implication processors preferred sesame seed with composition of dirt below 5% and paid premium to it, while those with composition above 5% were discounted and or

returned back to the suppliers for re-sieve. Similarly this sesame is safer for human consumption as seed mixed with sand can cause appendix problem.

4.6 CONSTRAINTS TO SESAME VALUE CHAIN

This entails the key areas of non performance of the sesame value chain, challenges that are specific to different value actors were studied and described.

4.6.1 Sesame Production

Constraints of sesame production were identified and presented in Table 11.

Table 11: Constraints to Sesame Production

Constraints	Frequency	Percentage	Ranking
Inadequate inputs	42	70.00*	3 rd
High cost of input	47	78.00*	2 nd
Adulterated/Counterfeit input	28	46.67*	10 th
Pest and diseases	34	56.67*	7 th
Windstorm	36	60.00*	5 th
Drought	38	63.33*	4 th
Theft	35	58.33*	6 th
Seed shattering/post harvest losses	32	53.33*	8 th
Transportation	20	33.33*	11 th
Price uncertainty/low price	55	91.67*	1 st
In ability to bargain price	30	50.00*	9 th
Others	15	25.00*	12 th

* Multiple Responses Possible

Source: Field Survey, 2013

The results in Table 11 revealed that majority (91.7%) of the sesame farmers were constraint by price uncertainty/low price of their produce this is because the value chain was not developed to guarantee the prices of the commodity talk less of establishing the price before production as found in a well developed value chain . This is true when one looks at the sudden and rapid changes in the prices of this product due to distortions in their demand and supply. Also 78% of the sesame farmers suffered from high cost of input, 70% complaint of lack of input. The

problems with input may not be far from the reason that, the value chain is not well developed as the input suppliers found in the study were rudimentary and just petty traders who tour local markets. Well established agro-chemical companies were absent in the sesame value chain. About 63%, 60%, and 58% of farmers were being faced by the problems of drought, windstorm, theft and pest and diseases respectively. These problems are more or less meteorological which can only be checkmated by adjustments in the agronomical practices of the farmers. While 33% and 30% of the sesame producer were constrained by transportation and in ability to bargain sesame price respectively. These problems may be due to the farmers working in isolation without cooperative association, thus grouping themselves in to commodity association may be part of the solution. Such problems were been reported by Kabiru (1998), Sokomi (2011) and Tiamiyu *et al* (2013).

4.6.2 Sesame Trading

Trading of sesame along its value chain in the study area was faced with myriads of problems. The problems are presented in Table 12.

Table 12: Constraints to Sesame Trading

Constraints	Frequency	Percentage	Ranking
Adulterated sesame	12	33.3*	4 th
Theft	10	27.7*	5 th
Handling problem	13	36.1*	3 rd
Transportation problem	20	55.6*	2 nd
Price uncertainty	32	88.8*	1 st
In ability to bargain price	8	22.2*	6 th
Others	5	13.8*	7 th

* Multiple Responses Possible

Source: Field Survey, 2013

The results in Table 12 revealed that, 89% the sesame traders were constrained by Price uncertainty hence ranked first, reason to this may not differ

from the fact that, the sesame value chain was not developed to guarantee the prices of actors along the chain. Transportation was ranked second (56%) among the constraints faced by the traders. This is true when one looks at the functions of the traders in terms of geographical coverage in linking areas of production and consumptions. The challenge may be due to bad roads, fuel hike and the cost of vehicle maintenance put forward by the transports agents. Thirty six percents (36%) of the sesame traders suffered from the challenges of handling. While 33% of the traders adduced the problem of adulterated sesame seed with sand, seed of other crops and or leaves and stalk remains of the plant. This may be due to negative attitudes of some farmers and rural collectors especially where the commodities are sold by weight, Slightly above a quarter (27.7%) of the sesame traders were being faced with the problems of theft. Reason to theft may due to the unemployment situation of the country where majority of the youth are not employed especially in rural areas when the peak period of labour employment in agricultural activities might have declined and at the same time rural festivities were around the corner. Others (13.8%) traders were constrained by other problems like buying sesame cured with herbicide to induced quick dryness. This problem was viewed in two fold; firstly it was done to avoid theft when dried away home and secondly to benefit from a high price regime. Such problems were been reported by Abdu (2008), Sokomi (2011) and Achike and Anzaku (2012).

4.6.3 Sesame Processing

Sesame processing along the value chain was bedeviled with challenges; these challenges are summarized in Table 13.

Table 13: Constraints to Sesame Processing

Constraints	Frequency	Percentage	Ranking
Inadequate processing capital	32	88.8*	2 nd
Adulterated sesame seed	28	75.0*	4 th
Problems of contract transaction	24	66.7*	5 th
Price uncertainty/fluctuations	36	100.0*	1 st
Price bargain problem	30	80.3*	3 rd

* Multiple Responses Possible

Source: Field Survey, 2014

The results in Table 13 revealed that all (100%) the sesame processors were constrained by price uncertainty/fluctuations, because price of the sesame is not static partly due to demand and supply and the colluding effect of the traders, hence ranked first. Inadequate processing capital was ranked second (88.8%) among the challenges. The reason to this was because of the absence of any formal financial institution in the value chain probably due to undeveloped nature of the chain, as the actors confirmed of their personal savings and or advance made available for a later product payment. More so, the processing capital inform of processing equipments, facilities and cash are either lacking or in adequate. Majority of the sesame processors (80.3%) suffer from the problem of bargaining the price of the commodity. Greater percentage (75% and 66.7%) of the sesame processors confessed of being challenged with adulterated sesame and problems of contract transaction with traders and the exporters respectively. This calls for honesty and integrity on the part of the actors.

4.6.4 Sesame Export

The challenges identified to affect sesame export along the value chain are presented in Table 14

Table 14: Constraints to Sesame Export

Constraints	Frequency	Percentage	Ranking
Transportation/clearing problems	4	66.7	4 th
Currency exchange problems	5	83.3	2 nd
Problems of contract transaction	4	66.7	3 rd
Price uncertainty/fluctuations	6	100	1 st
Problems of previous year price	3	50.0	5 th
Problems associated with policies (fiscal)	2	33.3	6 th
Quality standard issues	1	16.6	7 th

Source: Field Survey, 2014

The results in Table 14 revealed that all (100%) the sesame exporters were constrained price uncertainty/fluctuations a result of rudimentary value chain. Currency exchange (83%) was ranked second while contract transaction that is given out money in advance of product payment and problems of clearing (67% each) were found affect sesame exports. These problems may be due to inflationary condition of the economy and as earlier posited by Anga, (2011) that agricultural produce from Nigeria are mainly exported in raw forms hence fetched small amount of foreign currencies which in turn devalued our local currency, similarly dishonesty in the part of other value chain actor also constitute contract problems. Problems of previous years price (50%) was another challenges acknowledged by the exporters. This is because the commonest reference point of most of the value chain actors was to compare the past and the presence prices in making their pricing decision. These challenges were true considering the sudden and rapid changes in the prices of this commodity due to distortions in their demand and supply, currency exchange and oil price in the world market, more so, foreign exchange that subjected Naira to fluctuations in the market is another point to note. Similarly, contract transaction between the export companies and the sesame processors were

not without problems. Similarly, fiscal policies (taxes, interest rate etc) posed bottlenecks along the value chain to the sesame exporter

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The study examined the value chain analysis of sesame (*Sesamum indicum* L.) along Jigawa-Kano axis, Nigeria. Jigawa-Kano axis was selected as the area of

the research due to the intensity of production and marketing of sesame hence Jigawa state was ranked 2nd largest producing state in the country. Sesame was selected for the study because is widely grown in the state as one of the major export crops, its economic potential as a source of foreign exchange and the demand for sesame and its products both at domestic and international markets. It is also a drought tolerant and is primarily adapted to areas with long growing season and well drained soils. The study involved the use of multistage sampling technique. The first stage was the purposive selection of three agricultural zones of the ADPs because of their participation in production and marketing of sesame in the state. The second stage involved the purposive selection of two local government areas within a zone, i.e those with highest sesame production and marketing activities.

Two villages out of five most sesame producing villages were purposively selected from each of the six LGAs making a total of 12 villages. Five (5) sesame farmers (from each of the selected villages) making sixty (60) farmers were randomly selected and participated in the study at the entry point. In the downstream level of the value chain, traders name were collected from the selected farmers and formed the sampling frame, from which thirty six (36) traders were randomly selected. The traders gave the names of 36 artisanal processors and were all selected because of their limited number. As a chain six exporters name were also given by the traders and all selected because of their limited number. Data for the four key value chain actors were collected using four separate sets of questionnaires; data were subjected to both descriptive and inferential statistics. The

results revealed that, sesame farmers produced an average of 535Kg/ha. They have an average age of 43.2years who were mostly married with their household sizes ranging between 1and 20 persons. Majority of the farmers have acquired one form of western education or the other next to the Qur’anic education, though the level of western education was mostly at primary level. The sesame farmers were all male and majority small scaled farmers, with an average of 8.6 years of experience in the sesame production. Result further established that, sesame farmers prefer white colored, big sized seed and improve variety for the production business.

The result also revealed that all the socio-economic variables included in the study such as age, marital status, household size, years of education, years of experience and farm size of the producers influenced the output of the crop. Household size, years of education, years of experience and farm size of the producers positively influenced the output of this commodity while age and marital status had a negative influence. Similarly, sesame producers were found to be price takers because sesame price and market information were not governed by the farmers but other actors who functioned in the downstream level of the chain.

Profitability indicators such as Net Farm Income (₦48, 911/ha), return per naira invested (0.47), gross ratio (0.68) and operation ration (0.61) indicated that sesame production was profitable. Challenges of the sesame production include inadequate inputs, high cost of input, adulterated /counterfeit input, pest and diseases, windstorm, drought, theft, seed shattering, transportation, price uncertainty/low price and in ability to bargain price of the commodity.

Result of the sesame trading, revealed that, traders have an average age of 44.70 who were mostly married with household sizes ranging between 1 to 20 persons. Majority of the traders obtain western education though mostly at secondary level, with mean years of experience in sesame trading of 8. Result on preference information shows that, white colored, big sized and dirt free sesame seed was preferred. The results further revealed that, marketing margin of (₦71.800/ton) and return per Naira invested of (0.25) was realized for a ton of sesame. It was also found that, sesame trading was profitable. Major challenges of the traders were price uncertainty, adulterated sesame seed, transportation problem, handling problem, theft, problem of price bargain and others like buying sesame seed cured with pesticide.

Result of the sesame processors revealed that, the artisanal processors were all female with the mean age of 35.6 who were mostly married with household sizes ranging between 2 to 15 persons. Majority of the processors obtain western education though mostly at primary level though few had secondary education, mean years of experience in sesame processing was 9 years. The result also revealed that, the socio-economic variables included in the study influenced the quantity of sesame processed. Preference information from the processors shows that, white colored, small sized and dirt free sesame seed with below 5% foreign body was preferred.

The results further revealed that, processing margin of (₦80.000/ton) were found for artisanal processing. It was also found that, sesame processing was profitable. Challenges faced by the processors were, adulterated sesame seed,

problems associated with contract transaction, price uncertainty and problem of price bargain of the products.

Sesame exporters have an average age of 45 years with their household sizes ranging between 1 and 6 persons. All the exporters have tertiary education. The sesame exporters were all male and having an average of 10 years of experience in the sesame export. The socio-economic variables included in the study such as age, household size, years of education and years of experience were found to positively influence the quantity of the commodity exported. The export margin of (N31,750/ton) shows that export activities were profitable. Challenges of the sesame exports include problems associated with contract transaction, price uncertainty, currency exchange problems, transportation/clearing problems, previous year price and problems associated with state policies.

5.2 CONCLUSION

Sesame was mainly produced as a cash crop; about one tenth of the sesame output was utilized locally to produce snacks. Average yield of 535 kg ha⁻¹ produced by farmers in the study area was too low compared with what is obtained (1000 kg ha⁻¹) when grown under good management practices (improved varieties). The sesame value chain in the study area was not well developed, though both upstream and downstream levels of the sesame value chain were found to be profitable. This could be evidenced from the amount of profits realized by the actors for their enterprises and activities along the chain. Additionally, sesame value chain was found to be governed by traders, processors and exporters for price control, price bargain and control of information respectively. Commodity characteristics found

to affect its preferences along the value chain were color, size, variety and composition with foreign bodies. .

5.3 RECOMMENDATIONS

The study offers the following recommendations based on its findings:

1. Productivity and production of the sesame could be enhanced through increased utilization of improved varieties of sesame with desired characteristics.
2. Provision of well managed contract farming/transaction can be used as an effective way to coordinate and promote the value chain of quality sesame for use by domestic industries and for export since all the actors in the value chain will benefit from the techniques adopted.
3. The level of western education on the side of the sesame farmers was low. Training or capacity building of the farmers to enhance sesame production should be provided by both the public and the private sectors may be in form of adult education.
4. Fabrication of simple and affordable easy to operate machines shall be promoted in order to lessen the cost of labour especially in the areas of production which constitute the greatest operating cost.
5. Agro-inputs companies should be involved to provide genuine and adequate inputs at reasonable and affordable prices as at when due in order to enhance the production and the productivity of the enterprise.

6. Commercial banks and other financial institutions should provide loans and credits to the value chain actors in order to check mate the problem of inadequate production and trading capital.
7. There should be the provision of necessary infrastructures by both private and public to ease transportation and also in the areas of storage and post harvest handling of the commodity to bring wastage to the barest minimum.
8. Provision of a guaranteed minimum price for all the enterprises in the sesame value chain will create transparency in the chain as at present all the actors' complaint of price uncertainty and low prices for their products.
9. A standard measure for the commodity should be developed, as *mudu* and sacks of variable sizes are being used to measure the commodity at some enterprises level of the value chain.
10. Value chain actors at both upstream and downstream activities should be trained on improved production and marketing strategies by both the public and the private sector.
11. Women should be encouraged to participate more in the downstream sector of the sesame value chain for increased self-employment and reduction of poverty.

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Appendix i

Department of Agricultural Economics and Extension

Faculty of Agriculture

Bayero University, Kano

P. M. B 1026, Kano State – Nigeria

Title: Value Chain Analysis of Sesame in Jigawa State

I am a postgraduate student of the above named department, examining value chain analysis of sesame in Jigawa state, the information is needed for academic purpose only, and therefore all responses will be treated confidentially.

Farmers Questionnaire

Part I: Farmer socio-Economic characteristics

1. Name of farmer -----
2. Name of farmer's village -----
3. Name of farmer's L. G. A-----
4. Name of respondent's cluster (agribusiness) -----
5. Farmer's category a. Small scale () b. Medium Scale () c. Large scale ()
6. Sex: a- male () b- female ()
7. Age: -----
8. Marital status: a. Single () b. Married () c. Divorced () d. Widowed ()
9. Literacy level: 1. Qur'anic () 2. Primary () 3. Secondary ()
4. Tertiary ()

10. Household size: a. Adult male above 18 yrs ----- b. Children male below 18 yrs -----
 c. Adult female above 15 yrs ----- d. Female children below 15 yrs -----
11. Size of farm holding-----
12. Years of farming experience -----

Part ii: Sesame farmer's production information

13. Size of farm put to sesame production -----
14. For how long have you been engaged in sesame cultivation? -----
15. What was the quantity of your sesame total output in the year 2013? -----
16. What quantity did you consume? -----
17. What quantity did you offer for sale? -----

Part iii: Input information

18. How did you acquire the farm? a. Inherited () b. Gift () c. Purchased ()
 d. Lease () e. Loan / Hire () f. Others specify -----
19. Name of the dealer you bought your inputs from during the 2013 cropping season -----
20. What quantities of inputs did you purchase during 2013 cropping season? a. seed-----
 b. fertilizer----- c. agro-chemicals----- d. Labour -----
 e. others -----

21. Value of inputs you purchased during 2013 cropping season? a. seed (₦)-----
 b. fertilizer (₦) ----- c. agro-chemicals (₦)----- d. Labour -----
 ----- e. others -----

Part iv: Sesame selling information

22. To whom did you sale your sesame? -----
23. What quantity did you sold to him/her? -----
24. At what price per Kg did you sold the sesame to him/her -----
25. What are the barriers to sesame production business? a. large capital requirement () b. Information barrier () c. others -----
26. Where do you sell your sesame? a. In the farm (): Name of the buyer -----
 ----- b. In the village (): Name of the buyer----- c. In the village market (): Name of the buyer-----
 d. In the nearby market (): Name of the buyer f. Others-----
27. To whom do you mainly sell your sesame? a. Sesame rural assemblers (): Name of the buyer----- b. Sesame bulk assembler (): Name of the buyer-----
 ----- c. Sesame commission agent (): Name of the buyer-----
 ----- d. Sesame processors (): Name of the buyer----- e. Sesame exporter (): Name of the buyer-----
 ----- f. Sesame consumer (): Name of the buyer ----- g. others -----
28. What is the mode of selling your sesame? a. sales for prompt payment () b. sales on credit () c. product payment for credit advanced () d. others -----

29. Were you aware of the prevailing market information? a. Yes () b. No ()
30. If yes from who? a. Sesame rural assemblers () b. Sesame bulk assembler ()
 c. Sesame commission agent () d. Sesame processors () e. Sesame exporter () f. others -----
31. Do you negotiate for the sesame price? a. Yes () b. No ()
32. If No to 31 above, who offer the price? -----
33. Do you partake in the sesame price formation? a. Yes () b. No ()
34. Is there free marketing of sesame? a. Yes () b. No ()
35. If No to 34 above, what are the barriers? -----
36. Who decides the sesame production? a. producer () b. buyer () c. others -----
37. Who control the Price of sesame? a. Producers () b. Traders () d. processors () e. consumers ()
38. Who control the information? a. Producers () b. Traders () d. processors ()
 e. consumers ()
39. Who control the technology? a. Producers () b. Traders () d. processors ()
 e. consumers ()

Part v: Sesame attributes preferred

40. What type of sesame did you grow? a. White () b. Brown () c. Blackish () d. Others ()
41. Why? -----

42. Variety of sesame produced a. Local () b. Improved () c. Both ()
43. Why? -----
44. Sesame seed size preferred a. Small size () b. Big size
45. Why? -----
46. What are your reasons for growing sesame? a. Ease of production () b. other crop failure () c. Subsistence () d. Market () e. C and D f. Others -----
47. How is your sesame cropping pattern? A. Sole () b. Mixed () c. Others-----
48. List sesame varieties you grow a. ----- b. ----- c. ----- d-----
49. Any other required attributes of sesame not mentioned above-----

Part vi: Sesame cost and returns

50. Where do you get your seed for planting? a Saved () b. Market (): Name of the dealer----- c. JASCO () d. RUFIS () e. Others-----
51. How do you acquire the seed? a. Purchase () b. Gift () c Credit advance from buyers () d. Loan () e. Others-----
52. Quantity of seed used during 2013 cropping season -----
53. Cost of seed per unit of measure used (₦) -----
54. Where do you get your fertilizer for planting? a. FYM () b. Market (): Name of the dealer----- c. JASCO () d. RUFIS () e. Others-----
55. How do you acquire the fertilizer? a. Purchase () b. Gift () c. Credit advance from buyers () d. Loan () e. Others-----

56. Quantity of fertilizer used during 2013 cropping season -----
57. Cost of fertilizer per unit of measure used (₦) -----
58. Where do you get your agro- chemical? a. JASCO () b. Market (): Name of the dealer---- c. RUFIS () d. Others-----
59. How do you acquire the agro- chemical? a. Purchase () b. Gift () c. Credit advance from buyers () d. Loan () e. Others-----
60. Quantity of agro-chemical used during 2013 cropping season -----
61. Cost of agro-chemical per unit of measure used (₦) -----
62. Type of labor used a. Hired () b. Family () c. Both ()
63. Cost of labor used during 2013 cropping season (₦) -----
64. Quantity of sesame produced during 2013 cropping season-----
65. Cost of sesame per unit of measure produced during 2013 cropping season (₦) ---
66. Quantity of sesame kept for consumption-----
67. Quantity of sesame offered for sale-----
68. Price of sesame per unit of measure sold in 2013 cropping season
69. Value of by-product produced (₦) -----

Part vii: Constraints to sesame production.

70. What are your constraints to input access and utilization: a. lack of input () b. high cost of input () c. Adulterated/counterfeit () d. Others-----
71. What are your agronomic constraints to sesame cultivation: a. drought () b. windstorm () c. pest and disease d. theft () e. Seed shattering/post-harvest losses () d. Others-----

72. What are the constraints related to selling of sesame: a. Transportation problem () b. Storage problem () c. Price uncertainty/ low price () d. In ability to bargain prices e. Others-----

73. Any other constraint not mentioned above-----

Appendix ii

Department of Agricultural Economics and Extension

Faculty of Agriculture

Bayero University, Kano

P. M. B 1026, Kano State – Njgeria

Title: Value Chain Analysis of Sesame in Jigawa State

I am a postgraduate student of the above named department, examining value chain analysis of sesame in Jigawa state, the information is needed for academic purpose only, and therefore all responses will be treated confidentially.

Traders Questionnaire

Part I: Trader socio-Economic characteristics

19. Name of trader -----
20. Respondent's trading category a. small () b. medium () c. Large ()
21. Sex: a. male () b. female ()
22. Age: -----
23. Marital status: a. Single () b. Married () c. Divorced () d. widowed ()
24. Literacy level: a. Qur'anic () b. Primary () c. Secondary () d. Tertiary ()
25. Household: a. Adult male above 18 yrs ----- b. Children male below 18 yrs -----
d. Adult female above 15 yrs ----- e. Female children below 15 yrs -----
26. Years of trading experience-----

Part ii: Sesame trading information

27. For how long have you been engaged in sesame trading -----
- 10 How did you acquire the capital for trading? a. saved b. Gift () c. Loan ()
d. others specify ----
11. Quantity or volume of sesame purchased in the year 2013 -----
12. Price per kg of sesame purchased in the year 2013 -----
13. Value of sesame purchased in the year 2013 -----
14. To whom did you resale your sesame? -----
15. Where do you resale your sesame? -----
16. What quantity did you resale to him/her? -----
17. At what price per Kg did you resale the sesame to him/her -----
18. What are the value addition activities have you undertaken? a. re-bagging ()
b. handling () c. storing () d. transporting () e. others -----
19. What is the value of your value creation activities per kg of sesame undertaken -
20. What are the barriers to sesame trading? a. large capital requirement () b.
Information barrier () c. others -----
21. From where do you purchase your sesame? a. From the farm () b. from the
village () c. from the village market () d. from the nearby market e.
Others-----
22. Quantity of sesame purchased in the year 2013 -----
23. Price per kg of sesame purchased in the year 2013 -----
24. Value of sesame purchased in the year 2013-----

25. Quantity of sesame resale in the year 2013 -----
26. Price per kg of sesame resale in the year 2013 -----
27. Value of sesame resale in the year 2013 (₦) -----
28. Where do you resale your sesame? a. In the village market () b. In the nearby market () c. to the commission agent () d. to the buying company () e. others-----
29. To whom do you resale your sesame? a. Sesame bulk assemblers (): Name of the buyer ----- Sesame commission agent (): Name of the buyer-----
----- d. Sesame processors (): Name of the buyer-----
e. Sesame exporter (): Name of the buyer----- f. to the buying company () Name of the buyer----- g. others-----
30. What is the mode of resale of your sesame? a. sales for prompt payment () b. sales on credit () c. product payment for credit advanced () d. others -----
31. Were you aware of the prevailing market information? a. Yes () b. No ()
32. If yes from who? a. Sesame rural assemblers () b. Sesame bulk assembler () c. Sesame commission agent () d. Sesame processors () e. Sesame exporter () f. buying company g. others-----
33. Do you negotiate for the sesame price? a. Yes () b. No ()
34. If No to 33 above, who offer the price? -----
35. Do you partake in the sesame price formation? a. Yes () b. No ()
36. Is there free marketing of sesame? a. Yes () b. No ()
37. If No to 36 above, what are the barriers? -----

38. Who control the Price of sesame? a. Producers () b. Traders ()
c. processors () d. consumers () e. exporters () f. others

39. How is it control -----

40. Who control the information? a. Producers () b. Traders () d. processors ()
e. consumers () e. exporters f. others -----

41. How is it control -----

Part iii: Sesame qualities preferred for trading

42. Sesame color preferred a. White () b. Brown () c. Blackish () e.
Others-----

43. Why? -----

44. Sesame seed size preferred a. Small size () b. Big size

45. Why? -----

46. What are your reasons for trading in sesame? a. Ease of trading () b. High
profit () c. Others -----

47. List sesame types you trade on a ----- b ----- c----- d----

48. Any other desirous attributes of sesame not mentioned above -----

Part IV: Sesame trader cost and return information

49. Quantity of sesame purchased in the year 2013 -----

50. At what price per kg did you purchased the sesame in the year 2013 -----

51. Value of sesame purchased in the year 2013 (₦) -----

52. Transport charges from source to destination per 100kg bag (₦) -----

53. Handling and packaging charges incurred per 100kg bag (₦) (₦) -----

54. Levy/store and security charges per 100kg bag (₦) (₦) -----

55. Quantity of sesame resale in the year 2013 -----
56. Name of the dealer you resale the sesame to -----
57. Price per kg of the sesame resale (₦) -----
58. Value of sesame resale in the year 2013 (₦) -----
59. Where do you get your capital for sesame trading? a. Saved () b. Loan from F/institution () c. Gift 60. Credit advance from buyer e. others-----
61. How do you purchase the sesame? a. Pay on purchase () b. Purchase on credit () c. Collect as product repayment for credit advance to farmers () d. Others-----
62. How do you resale the sesame? a. Collect payment on resale () b. Sale on credit () c. Product repayment for credit advance collected () d. Others-----
63. Cost of sesame per unit of measure (100kg) purchased during 2013 season (₦) --
64. Cost of sesame per unit of measure (100kg bag) resale during 2013 season (₦) -

Part v: Sesame trading constraints.

65. What are the constraints related to purchase of sesame? a. Transportation problem () b. Storage problem () c. Pricing problems () d. Purchase of adulterated sesame () e. Handling problems f. large capital requiremente. others-----
66. What are the constraints related to resale of sesame? a. Storage problem () b. Pricing uncertainty c. High tariff charges. d. Handling problems e. Others-----
67. Any other constraint not mentioned above-----

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Appendix iii

Department of Agricultural Economics and Extension

Faculty of Agriculture

Bayero University, Kano

P. M. B 1026, Kano State – Nigeria

Title: Value Chain Analysis of Sesame in Jigawa State

I am a postgraduate student of the above named department, examining value chain analysis in Jigawa state, the information is needed for academic reasons only, and therefore all responses will be treated confidentially.

Processor's Questionnaire

Part I: Processor socio-Economic characteristics

28. Name of the sesame Processor -----
29. Respondent's processing capacity a. local () b. intermediate processor ()
30. Types of processing a. artisanal () b. Industrial () c. oil miller () d. others -----
31. Sex: a. male () b. female ()
32. Age: -----
33. Marital status: a. Single () b. Married () c. Divorced () d. Widowed ()
34. Literacy level: a. Qur'anic () b. Primary () c. Secondary () d. Tertiary ()
35. Household size: a. Adult male above 18 yrs ----- b. Children male below 18 yrs ----- d. Adult female above 15 yrs ----- e. Female children below 15 yrs -----

25. What are the barriers to sesame processing? a. large capital requirement () b. Information barrier () c. in -adequate technology () e. Pricing problems () f. others -----
26. From where do you get sesame to process? a. From the bulk assemblers () b. from the nearby market c. from the buying company () d. from the exporters e. Others-----
27. Quantity of sesame processed in the year 2013 -----
28. Processing charges (₦) per 100kg bag of sesame -----
29. Value of sesame processed in the year 2013 (₦) -----
30. To whom do you resale your processed sesame? a. Sesame bulk assemblers (): Name of the buyer -----b. sesame commission agent (): Name of the buyer----- d. Sesame processors (): Name of the buyer----- e. Sesame exporter (): Name of the buyer----- f. to the buying company () Name of the buyer----- g. others-----
31. What specific role do you play in sesame value chain? a. Process only b. Buy, process and sale c. Others-----
32. If (b) to 31 above, do you negotiate for the sesame price? a. Yes () b. No ()
33. If (a) to 32 above, who offered the price? -----
34. What is the mode of resale of your processed sesame? a. sales for prompt payment () b. sales on credit () c. product payment for credit advanced () d. others -----
35. Were you aware of the prevailing market information? a. Yes () b. No ()

36. If yes from who? a. Sesame rural assemblers () b. Sesame bulk assembler ()
c. Sesame commission agent () d. Sesame exporter () f. buying company
g. others-----

35. Do you partake in the sesame price formation? a. Yes () b. No ()

36. Is there free marketing (processing) of sesame? a. Yes () b. No ()

37. If No to 36 above, what are the barriers? -----

38. Who control the Price of sesame? a. Producers () b. Traders ()
c. processors () d. consumers () e. exporters () f. others

39. Who control the information? a. Producers () b. Traders () d. processors ()
e. consumers () e. exporters () f. others -----

Part iii: Sesame required qualities information

40. Sesame color preferred for processing a. White () b. Brown () c.
Blackish () e. Others-----

41. Why? -----

42. Sesame seed size preferred for processing a. Small size () b. Big size ()

43. Why? -----

44. What are your reasons for being in sesame processing? a. Ease of trading ()

b. High profit () c. Others -----

48. List sesame types you process a ----- b ----- c----- d-----

49. Any other desirous attributes of sesame for processing not mentioned above ----

Part IV: Processor cost and returns information.

50. Quantity of sesame processed in the year 2013 -----

51. Value of sesame processed in the year 2013 (₦) -----

52. Processing charges per 100kg bag of sesame (₦) -----
53. Cost incurred in processing 100kg bag of sesame (₦) -----
54. Name of the dealer you process sesame for -----
55. Where do you get your capital for sesame processing? a. Saved () b. Loan from F/institution () c. Gift d. Credit advance from buyer/customer e. Others-----
56. How do you process the sesame? a. Manual () b. using machine c. Others--
57. What aspect of processing do you undertake? a. De-hulling () b. de-stoning c. Packaging to required size. Others-----

Part v: Sesame processing constraints information

58. What are the constraints related to purchase of sesame? a. Transportation problem () b. Storage problem () c. Pricing problems () d. Purchase of adulterated sesame () e. Handling problems f. large capital requirementf. others
59. What are the constraints related to processing of sesame? a. Storage problem () b. adulterated sesame c. handling problems d. High tariff charges () f. large capital requirement e. Others-----
60. What are the constraints related to resale of processed sesame? a. Storage problem () b. Pricing uncertainty () c. High tariff charges () d. Handling problems e. Others---
61. Any other constraint not mentioned above-----

Appendix iv

Department of Agricultural Economics and Extension

Faculty of Agriculture

Bayero University, Kano

P. M. B 1026, Kano State – Nigeria

Title: Value Chain Analysis of Sesame in Jigawa State

I am a postgraduate student of the above named department, examining value chain analysis in Jigawa state, the information is needed for academic reasons only, and therefore all responses will be treated confidentially.

Exporter's Questionnaire

Part I: Exporter socio-Economic characteristics

- 43. Name of the sesame Exporter -----
- 44. Respondent's exporting category a. medium () b. Large ()
- 45. Sex: a. male () b. female ()
- 46. Age: -----
- 47. Marital status: a. Single () b. Married () c. Divorced () d. Widowed ()
- 48. Literacy level: a. Qur'anic () b. Primary () c. Secondary () d. Tertiary ()
- 49. Household size: a. Adult male above 18 yrs ----- b. Children male below 18 yrs
- d. Adult female above 15 yrs ----- e. Female children below 15 yrs -----
- 8. Years of exporting experience -----

Part ii: Sesame exporting information

- 9. For how long have been engaged in sesame exporting -----
- 10. Approximate volume of sesame export per year -----

11. How did you acquire the capital for sesame exporting business? a. saved
 b. Gift () c. Loan () d. others specify ----
12. Quantity or volume of sesame exported in the year 2013 -----
13. Price per kg of sesame purchased in the year 2013 (₦) -----
14. Price per kg of sesame processed in the year 2013 (₦) -----
15. Price per kg of sesame exported in the year 2013 (₦) -----
16. Value of sesame purchased/processed/exported in the year 2013 (₦) -----
17. Price per kg of exported sesame in the year 2013 (₦) -----
18. Value of exported sesame in the year 2013 (₦) -----
19. To whom did you resale your exported sesame? -----
20. Where do you resale your exported sesame? -----
21. What quantity of exported sesame did you resale to him/her? -----
22. At what price per Kg did you exported the sesame to him/her -----
23. What are the value addition activities you have undertaken? a. re-packaging ()
 b. handling () c. branding () d. storing () e. transporting/shipping ()
 g. others -----
24. What is the value of your value creation activities per kg of sesame undertaken
 (₦) -----
25. What are the barriers to sesame exporting? a. large capital requirement () b.
 Information barrier () c. Currency exchange rate () e. Pricing
 problems () f. others -----

26. From where do you get sesame to export? a. From the bulk assemblers () b. from the nearby market c. from the buying company () d. from the processors e. Others-----
27. Quantity of sesame exported in the year 2013 -----
28. Exporting charges (₦) per 50kg bag of sesame -----
29. Value of sesame exported in the year 2013 (₦) -----
30. To whom do you resale your exported sesame -----
31. What specific role do you play in sesame value chain? a. Export only b. Buy, Process and export c. Others---
32. If (b) to 31 above, do you negotiate for the sesame price? a. Yes () b. No ()
33. If (a) to 32 above, who offered the price? -----
34. What is the mode of resale of your exported sesame? a. sales for prompt payment () b. sales on credit () c. product payment for credit advanced () d. others -----
35. Were you aware of the prevailing market information? a. Yes () b. No ()
36. If yes from who? a. Other sesame exporter () b. buying company () c. Foreign traders () d. others--
35. Do you partake in the sesame price formation? a. Yes () b. No ()
36. Is there free marketing (exporting) of sesame? a. Yes () b. No ()
37. If No to 36 above, what are the barriers? -----
38. Who control the Price of sesame? a. Producers () b. Traders () c. processors () d. consumers () e. exporters () f. others

39. Who control the information? a. Producers () b. Traders () d. processors ()
e. consumers () e. exporters () f. others -----

Part iii: Sesame required qualities information

40. Sesame color preferred for exporting a. White () b. Brown () c.
Blackish () e. Others-----

41. Why? -----

42. Sesame seed size preferred for exporting a. Small size () b. Big
size ()

43. Why? -----

44. What are your reasons for being in sesame exports? a. Ease of trading () b.
High profit () c. Others -----

48. List sesame types you process a ----- b ----- c ----- d -----

49. Any other desirous attributes of sesame for export not mentioned above -----

Part IV: Exporter cost and returns information.

50. Quantity of sesame exported in the year 2013 -----

51. Value of sesame exported in the year 2013 (₦) -----

52. Export charges per 50kg bag of sesame (₦) -----

53. Cost incurred in exporting 50kg bag of sesame (₦) -----

54. Name of the dealer you export sesame to -----

55. Where do you get your capital for sesame exporting? a. Saved () b. Loan
from F/institution () c. Gift d. Credit advance from buyer/customer e.

Others-----

Part v: Sesame exporting constraints information

56. What are the constraints related to purchase of sesame? a. Transportation problem () b. Storage problem () c. Pricing problems () d. Purchase of adulterated sesame () e. Handling problems f. large capital requirement f. others-----

57. What are the constraints related to sesame exports? a. Storage problem () b. adulterated sesame c. handling problems d. High tariff charges () f. large capital requirement e. Others-----

58. Any other constraint not mentioned above-----

-

Appendix v

/METHOD=ENTER Frmer_Ctgry Age Mrtal_Sttus Ltrcy_Lvl Ttal_Frm_Szs Yrs_Frmn_Expr Ssm_Frm_Szs Yrs_Ssm_Cltvn.

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.786 ^a	.618	.575	471.59374

a. Predictors: (Constant), Years in sesame production, Farmer's Lieracy Level, Farmer's Marital Status, Total farm size in hectres, Farmer's Age, Farmer Category

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.910E7	6	3182617.723	14.310	.000 ^a
	Residual	1.179E7	53	222400.660		
	Total	3.088E7	59			

a. Predictors: (Constant), Years in sesame production, Farmer's Lieracy Level, Farmer's Marital Status, Total farm size in hectres, Farmer's Age, Farmer Category

a. Dependent Variable: Total quantity of sesame produced in 2013

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-564.318	390.619		-1.445	.154
	Farmer Category	328.466	143.375	.295	2.291	.026
	Farmer's Age	-2.829	8.657	-.034	-.327	.745
	Farmer's Marital Status	-16.875	109.974	-.016	-.153	.879
	Farmer's Literacy Level	240.105	70.373	.314	3.412	.001
	Total farm size in hectares	35.578	14.092	.318	2.525	.015
	Years in sesame production	36.840	18.762	.179	1.964	.055

a. Dependent Variable: Total quantity of sesame produced in 2013

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1368497.123	4	342124.281	2.932	.071 ^a
	Residual	1283502.877	11	116682.080		
	Total	2652000.000	15			

a. Predictors: (Constant), level of literacy, age of the respondents, size of the household, years of processing experience

b. Dependent Variable: quantity of sesame processed

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	332.139	1220.424		.272	.791
	age of the respondents	-2.993	9.932	-.064	-.301	.769
	size of the household	99.910	60.271	.377	1.658	.126
	years of processing experience	109.273	43.564	.707	2.508	.029
	level of literacy	356.249	109.859	.914	3.243	.008

a. Dependent Variable: quantity of sesame processed

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.895 ^a	.728	.695	7.66574

a. Predictors: (Constant), years of exporting experience, age of the respondents, level of literacy, size of the household

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	339941.236	4	84985.309	1.446E3	.020 ^a
	Residual	58.764	1	58.764		
	Total	340000.000	5			

a. Predictors: (Constant), years of exporting experience, age of the respondents, level of literacy, size of the household

b. Dependent Variable: quantity of sesame exported

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	206.989	42.753		47.412	.013
	age of the respondents	43.359	.649	1.204	66.819	.010
	level of literacy	120.471	6.800	.413	17.717	.036
	size of the household	-115.294	7.866	-.395	-14.657	.043
	years of exporting experience	38.892	3.588	.257	10.839	.059

a. Dependent Variable: quantity of sesame exported

**VALUE CHAIN ANALYSIS OF SESAME (*Sesamum indicum L.*) ALONG
JIGAWA – KANO AXIS, NIGERIA**

BY

**YA’U NUHU KATANGA B. Agric (UDUS), M. Sc (ATBU)
(SPS/10/PAE/00004)**

NOVEMBER, 2015

DECLARATION

“I hereby declare that this work, Value Chain Analysis of Sesame Along Jigawa- Kano Axis, Nigeria is the product of my own research efforts; undertaken under the supervision of Professor Abba Aminu and has not been presented elsewhere for the award of a degree or certificate. All sources have been duly acknowledged.”

.....
Signature and Date

YA’U NUHU KATANGA

(SPS/10/PAE/00004)

CERTIFICATION

“This is to certify that the research work for this thesis and the subsequent preparation of this thesis by YA’U NUHU KATANGA (SPS/10/PAE/00004) were carried out under our supervision”.

.....
Professor. Abba Aminu
(Supervisor)

.....
Date

.....
Professor. Z. Abdu
(Internal Examiner)

.....
Date

.....
Dr. A.B. Mohammed
(Head of Department)

.....
Date

APPROVAL PAGE

This is to certify that the research work titled “Value Chain Analysis of Sesame Along Jigawa-Kano Axis, Nigeria” undertaken by YA’U NUHU KATANGA (SPS/10/PAE/00004) has been examined and approved for the award of Ph.D. in AGRICULTURAL ECONOMICS in the Department of Agricultural Economics and Extension, Bayero University, Kano, Nigeria.

.....
Professor A. L. Ala
(External Examiner)

.....
Date

.....
Professor Abba Aminu
(Supervisor)

.....
Date

.....
Professor Z. Abdu
(Internal Examiner)

.....
Date

.....
Dr. A.B. Mohammed
(Head of Department)

.....
Date

.....
Dr. (Mrs.) A. Mustapha
(SPS Representative)

.....
Date

ACKNOWLEDGEMENTS

In the name of Allah, the Beneficent, the most merciful. All praises are due to Allah, creator of the world, the arbiter of all destinies, who taught man by the pen, the All-knowing and the most high, who sustained my life up to now and gave me the strength and perseverance to successfully complete this piece of work. May the blessings of Allah be upon His prophet Muhammad (SAW) the prime guide to humanity and to his companions and those that follows them rightly till the end of age.

My profound gratitude goes to my supervisor Professor Abba Aminu whose versatilities and thorough guidance tremendously enhanced the substance and quality of this project, my Internal Examiner Professor Zilkifilu Abdu for his valuable suggestion and guidance.

I must also acknowledge the support of the Management of Federal University Dutse, especially the contributions of Professor J. D. Amin, Professor A. M. Kundiri, and Professor U. Haruna. I appreciate the concern of the entire staff of the Department of Agricultural Economics and Extension, FUD and BUK. I am deeply thankful to Professor A. Suleiman, Professor M. I. Daneji, Dr. A. B. Mohammed, Dr. (Mrs.) A. Mustapha, Dr. Ali Abdullahi, Dr. Y. Iliyasu Dr. A. Shuaib, Amina L. Mustapha, A.A. Adomi and Hon Mustafa Makama.

My profound appreciation goes to my uncles Alh. Abdu D/baba, Alh. Dan'azimi, Ibrahim Ubani and Hon. Tsoho Rabi'u whose support and encouragement will remain indelible in my mind. To Hajiya Fatima, maryam and Salamatu for their prayers and moral support. This piece will be uncompleted without acknowledging my brothers Abdullahi, Ado and Musa. Sisters Jamilat, Salamat and Habeebat whose warmth and cheers have continue to spur me on. My dear friends Lawan, Hamisu and lot of others, to my former colleagues at IFAD CBARDP, Kiyawa Local Government, business partners and well wishers.

DEDICATION

To my father late Alhaji Nuhu, my mother Hajiya Aishatu, my brothers and sisters Abdullahi, Ado, Musa, Jameelat, Salamat and Habeebat, my wives Hajiya Hadiza, Maimunat and Sa'adatu, my children Ahmad Saleem, Muhammad Sameer, Muhammad Yaseer, Muhammad Nabil, Nuhu (Abba), Hassan, Salmanil Arabiyyi, Muhammad Salsabil, Ameer, Aliyu, Nuhu (Alhaji), late Nabeelat, Maryam, Fatima and Ameera.

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ABSTRACT

The study examined the value chain analysis of sesame (*Sesamum indicum L.*) along Jigawa-Kano Axis, Nigeria. Multistage sampling technique was employed for the selection of respondents (Farmers, Traders, Processors and Exporters). Sixty (60) sesame farmers were randomly selected at the entry point of the upstream level of the value chain. While in the downstream level, 78 actors which comprises of 36 traders, 36 processors and 6 exporters were selected. Data were collected with the aid of questionnaire. Data collected were analyzed using descriptive statistics, gross margin, marketing margin and multiple regressions. The results of the study showed that, sesame farmers, traders, processors and exporters were the Value Chain Actors (VCAs). It also revealed that, sesame farmer produced an average of 535Kg/ha. Mean ages of 43.2, 44.7, 38.6 and 45 years were obtained for farmers, traders, processors and exporters respectively. Mean household sizes of 12 and 5 persons were obtained for the farmers and exporters while traders and processors each had mean household size of 11 and 8 persons. Mean years of experience in sesame business of 8.6 and 8 years was obtained for farmers and processors, respectively, both the traders and the exporters have average of 10 years in sesame business. All the actors were male with the exception of processors who were all females (100%) and were found to undertake artisanal processing. It was also found that, seed color, size, variety and composition with foreign bodies were the physical characteristics affecting sesame preference and prices along the value chain. Similarly, the chain was found to be governed by traders for price control, price bargain and information. The profitability measures have indicated that farmers had a Net Farm income of ₦48,911/ha, traders had marketing margin of ₦71,800/ton while processors and exporters had ₦80,000/ton and ₦31,750/ton as processing and export margins, respectively. These values indicated profitable enterprises along the sesame value chain. Furthermore, age, marital status, household size, years of education and years of experiences were found to influence the quantity of sesame produced or traded by the VCAs. The challenges of the sesame value chain include inadequate input, high cost of input, transportation, price uncertainty/low price, inadequate capital, contract transaction, currency exchange problems, and policy issues. The study therefore, recommends that production and productivity along the sesame value chain could be improved through the provision of improved varieties with desired characteristics, well managed contract transaction, provision of necessary infrastructures and a guarantee minimum price for all sesame enterprises along the chain towards creating transparency in the chain such that all actors would be relieved of fear of price uncertainties.