ANALYSIS OF SPATIAL AND TEMPORAL PRICE EFFICIENCY OF SOME SELECTED FOOD GRAIN MARKETS IN THREE STATES OF NORTH WEST NIGERIA

BY

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(M Sc /AGRIC /25703 /2012-13)

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

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SEPTEMBER, 2015

DECLARATION

I hereby declare that this dissertation titled **'Analysis of Spatial and Temporal price Efficiency of Some Selected Food Grain Markets in three States of North West Nigeria',** has been written by me and it is a record of my research work. No part of this dissertation has been presented in any previous application for another Degree or Diploma in this or any other institution. All borrowed information have been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation titled '**Analysis of Spatial and Temporal Price Efficiency of Some Selected Food Grain Markets in three Sates of North West Nigeria',** by Aminu Abdullahi **ABUBAKAR** meets the regulations governing the award of the Degree of Master of Science in Agricultural Economics of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to Almighty Allah **(S.W.T)** Who Created the universe and the Creator of all creatures.

ACKNOWLEDGEMENT

I glorify the exalted name of Almighty Allah (SWT), the cherisher and sustainer of the universe, for His mercy, assistance and protection especially for seeing me through this programme successfully. I say: "*Alhamdulillah.*" I specially wish to express my deep appreciation and sincere gratitude goes to my supervisors, namely Dr Osaini Yusuf and Dr A. A. Hassan for their invaluable assistance, close supervision, constructive criticisms, suggestions and pieces of advice that aided the completion of this research work. May Allah bless you all and your families.

I sincerely express my gratitude to Prof Ben Ahmed, Prof S. A. Sanni, Prof Moses Maianguwa, Dr Damisa A. Maiyaki and the entire staff and students of the Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria.

I also wish to express my sincere gratitude and appreciation to my parents, Late Alhaji Abdullahi Abubakar Dankwanyawa, Hajiya Zulai Abdullahi, and Hajiya Salamatu whose parental care, encouragement and advice have been source of inspiration all through my life.

I wish to express my enormous thanks to Alhaji Ibrahim Shehu (Bursar, A.B.U Zaria), and also my special attention must be paid to his Wife Hajiya Naziha Ibrahim for their substantial support toward my academic career May Allah elevate you and reward you all with Jannahtul Firdausi, Amin.

My sincere gratitude and special thanks goes to my brothers and sisters: Hamisu, Dan-asabe, Magaji, Hajiya Jummai, Muhammad Sani (Maikudi), Hajiya Iyami, Abubakar (Baba), Isma'il, Baba Musa, Hadiza, Abu, Abdullahi (34), Hamisu, for their extreme support to the success of my academic endeavor May Allah reward them all with Jannatul Firdausi. My special thanks also goes to Prof A. Garba, Dr I. Salamatu, Dr S. Rafin-dadi, Dr Jibril, Dr S. Dahiru, Baba Musa Dankwanyawa, Lamma (Mika'ilu), and Khalid (shanono) for their considerable contribution given to me all through my studies.

I also wish to express my sincere gratitude and appreciation to Hajiya Fatimah Shehu, Hajiya Harira Lemir, Umma (Amina), Lifdil, Fadil, Ummal Khairi, Faiza, Salim (Khalifha), Lamir, Fauwaz, Hassana, Bube (Abubakar), Haruna Shehuu Usman (Honourable), Aunty Asabe, Kadariyya, Bahijja,

I will like also express my gratitude to Hassnan (Makarfi), Shamsu (Khadija), Aliyu (Gombe), Buhari Bello, Nura (Zamfara), Salisu (Salafi), Muhammad (Zamfara), Auwal (Shugaba), Abdullahi (Lamfai), Murtala (Taraba), Mukta (Bauchi), Ahmad (Borgu), Zakari (Zaks), Shamra (shami), Sadiq (india)and the entire people of U07Econs.

I will like to express my gratitude to Bashiru (Manba), Abbati Ahmad, Danbala, Kabiru (Mancha), Jamilu Jagindi, Baba iliya, Baba Yahaya, Rilwanu, Safari, Mustapha (samaru), Mallan Hamza, Aminu Hunter, Salihi, Samaila (Garkuwa), Mallan Dahiru (Kaf), Yusuf (Magona), Abba (Godo Godo), Sule Sabon Direba, Baba Karami, Abdul-razak, Mamami (Adamu), Danladi (Mangal), Mu'awuyya, Jamilu (PG), Aminu (soft Touch),Mamuda (Pizaro), Danjum Mai, Mallan Ma'azu, Danjuma, Abubakar (correct man), Yaro, Nafi'u, Baban Lasisi, Haidar (Zakin Dodo), Momila, Ibrahim M'khalil (IB), Shehu (Talo) and Jamilu, Bandarawu (Haruna), Abdul-Malik (G squre) Jamilu Shanono, Sa'idu Kaita, , Hassan Makarfi, Shamsu Lawal, Aliyu Gombe, Nura Zamfara,

Salisu Salafi, Magaji, Malan Ibrahim, Ibrahim (moski), Nura, Awwal (babba), Talatuwa, Amira, Nasiba, Sa'a, Wasila, Khalifa, Libras, Salim, Nabahani, Hadiza, Nasir, Yusuf (maigona), Ummi (Fatimah) and the entire people of BQ etc. Finally, may the peace and blessings of Allah be upon His noble prophet Muhammad (SAW), his household, companion and those on their foot paths till the day of reckoning.

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Abstract

The study analyzed the spatial and temporal price efficiency of food grain markets in three states of North West Nigeria. The study was carried out in Kano, Kaduna and Katsina states. The study used both primary and secondary data. The primary data were collected by means of structured questionnaire and focus group discussion while the secondary data used covered monthly price for 96 months (2007-2014). The objectives of the study are to describe the socio-economic characteristics of food grains marketers (Wholesalers) in the study area, to determine the marketing margin of food grains marketing, to describe the trend in the price of some selected food grains markets, to estimates inter market price differentials in relation to transport and other transaction costs, to examine the significance of storage cost as a factor in explaining seasonal price variation and describe the constraint to food grains marketing in the study area. Data were analyzed using simple descriptive statistics, marketing margin model, spatial price model and temporal price model. Seven markets known for food grain marketing (Dawanau, Giwa, Ikara, Pambeguwa, Funtua, Dandume and Danja) were purposively selected. Out of these seven markets, Dawanau market was used as the reference market while Giwa, Ikara, Pambeguwa, Funtua, Dan-dume and Danja markets were used as the supplying markets. The choice of Dawanau market as the reference market was based on large supply of food grains to Dawanau market compared to other markets. The findings of the study revealed that all the respondents were male and married and majority (50%) had 21-30 years of marketing experience. The average marketing margin across the markets were ₦6,286, ₦15,000, ₦16,143 and ₦13,571 for Maize, Mill rice, Cowpea and Soyabean respectively, indicating that food grain marketing was profitable in the study area. The analysis of inter-market price relationships revealed price spread in excess of transfer costs (1570 price spreads out of 2304 is positive) in the study area, implying imperfections and inefficiency in the marketing system. The appearance of unusually high positive price spreads may be attributed to several factors including, lack of adequate market information, sporadic transportation service, traditional buying and selling practices that condition traders to buy and sell grain only in specific markets regardless of prevailing prices, poor road infrastructure, and high market risks. Analysis of temporal price relationships indicated that seasonal price increases commonly exceeded cost of storage for rice (54 out of 56 instances), cowpea (54 out of 56 instances) and soyabean (47 out of 56 instances) which provided the opportunity for marketers to make more than normal profit. Among the constraints identified by the responds in the study area were transportation problems (30%) and inadequate market infrastructure (27%) as well as poor storage facilities (26%). Government, preferably with the involvement of communities, as well as local contractors and technician should embark on planning, construction, rehabilitation and maintenance of rural feeder roads. This will minimize problem faced by the markets and allow for easy flow of food grain from the rural markets to urban markets where the demand is high. The government, with the help of the local farmer and the marketers, should provide for more and better dissemination of market intelligence among farmers and traders to improve knowledge, combat uncertainties concerning supply and demand and decrease the risk associated with inter-market trade. This would help to reduce price uncertainty.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agricultural production plays an important role in the economic development of Nigeria. An estimated 60% - 70% of Nigerians live in the rural areas and majority is engaged in small scale agricultural production (Okunneye, 2003; Adegboye, 2004). Sustainability of agricultural activities is hinged on effective price system. In the recent past, the market for agricultural commodities in Nigeria has shown a pattern of long-term price fall and short term price instability (IMF, 2000).

The volatility in price of agricultural commodities in Nigeria has been attributed to various factors including variances in bargaining power among consumers, cyclical income fluctuation among sellers and consumers, seasonality of production, natural shocks such as flood, pests, diseases, and inappropriate response by farmers to price signals (Gilberts, 1999; Adebusuyi, 2004; Udoh and Sunday, 2007). Short- run fluctuations in agricultural commodity prices occur between production seasons (Cashin and Pattillo, 2000). During harvesting periods, prices of farm product are generally low due to surpluses; in the off season, prices rose due to reduce production and seasonal changes (Akpan, 2002). Hence, agricultural commodity price is one of the major determinants of quantity of commodities supplied by farmers and demanded by consumers. Product price instability among agricultural commodities is a regular phenomenon in markets across Nigeria (Akpan, 2007).

Instability in commodity prices among markets could be detrimental to the marketing system and the economy as a whole. It could cause inefficiency in resources allocation among sellers and consumers depending on the source of variability (that is, whether it is induce by supply or demand side or both). It could also increase poverty level among low income earners in the society (Polaski, 2008). On the order hand, a unified product price among markets is not a rational policy to pursue in a developing country like Nigeria. This is because of the deteriorating marketing infrastructures, increase in cost of externalities and the nature of most agricultural products which often resulted in significant differences in the total variable costs incurred by sellers and consumers in these markets.

Spatial pricing efficiency examines how prices in different markets over space are related, especially through transportation cost. When spatial trade is efficient, food shortages in deficit regions are transmitted to surplus regions via prices (Arndt et al, 1998) and arbitrage triggers flow of food across space. Through efficient spatial arbitrage, the risk of crop failure in some regions is shared over a large market area, and prices are more stable and food shortage may be prevented. An important step toward improving the functioning of markets in this case is to understand the nature and effects of transaction costs facing input supplies, farmers, food retailers, and/or consumers (Goetz, 1995).

Storage is the holding of goods from the time of production until when they are needed. Seasonality is a marked characteristic of agricultural production. More than 80% of the agricultural production in Nigeria is done under rain fed condition (Olukosi *et al*, 2005). Thus products need to be effectively stored overtime to ensure supply during off season because the demand for farm products is relatively constant all year round. Consumers

want the same kind of food all the year round and industries must get continuous supply of raw materials. In order to satisfy these needs, commodities must be stored and preserved until when needed, since storage confers on the commodity the utility of time (Olukosi and Isitor, 1990).

Prices observed through time are as a result of a complex mixture of changes associated with seasonal, cyclical, trend and irregular factors. The most common regularity observed in agricultural prices is a seasonal pattern of change. Normally, prices of storable commodities are lowest at harvest time, rise as the season progresses, and reach a peak prior to the next harvest (Olukosi and Isitor, 1990). The purpose of selling directly to consumers is to reduce the charges for possession utility. Anytime an intermediary is forced to own and hold inventory, it must be financed. These finance charges for possession utility are included in the purchase price of the product (Downey and Erickson, 1987).

Maize (*Zea mays*), Rice (*Oryza Sativa*), Cowpea (*Vigna unguiculata*), and Soyabean (*Glycinemax*) are among food grains (Ayinde and Adejobi, 2002), whose prices are highly unstable between seasons in North-West part of the country (states like Kano, Kaduna and Katsina). This study will therefore analyze spatial and temporal price efficiency of maize, rice, cowpea and soybeans in the North West Nigeria.

1.2 Problem Statement

In a developing country like Nigeria, efficient marketing system promotes economic development by encouraging specialization and leading to output enhancement (Olukosi and Isitor, 1990; Tura *et a*l., 2010). It encouraged farmers to boost their productivity and traders (wholesalers) to expand their marketing activities and thereby contributing to the improvement of both the urban and the rural income in developing countries. Beyond this, it reduces post harvest loses, ensure adequate returns to traders and stimulate expansion in marketing efficiency, thereby enhancing the level of food security and encouraging agricultural marketing in Nigeria (Ladele and Ayoola, 1997).

However, despite the central position occupied by food grains in addressing rural hunger, source of employment and income generation, Nigerian government and other stakeholders continue to pay less attention to its marketing systems. As a result, the system is still undeveloped and lack institutional support. This coupled with weak infrastructure, poor transportation facilities, poor storage facilities and inefficient pricing system which translates into low efficiency and renders the system malfunctioning and uncompetitive.

In addition, few policy initiatives on food grains by successive government of Nigeria have focused more on the supply side (intensive production) with little emphasis of its marketing and distribution. But increasing production without a corresponding efficient marketing strategy being put in place to ensure its accessibility would not stimulate farmers as well as the traders (wholesales) to enhance production, distribution and exchange since the excess would be wasted through post- harvest loses and price volatility.

Also, most speculative middlemen only believe in hoarding or buying food grains during harvest and sell when prices rises, which might have adverse effect on the self-food sufficiency policy of the federal government. Very little is known to the wholesalers as regards whether is profitable to buy and sell at the same time of the season across different locations due to insufficient market information. On the other hand, consumers pay different amounts for the same product in different markets separated by few kilometers. Price instability of agricultural commodity would be considered a normal phenomenon, if it does not significantly differ from one market to another. On the contrary, if product prices are significantly different among markets it will distort resources flow, which might have adverse effect on the self- food sufficiency policy of the federal governments.

Over the years, there have been a number of studies on price transmission, market integration, market performance, market efficiency as well as marketing margin of food grains in Nigerian markets. Examples of such studies are studies conducted by: Dittoh (1994), Okoh (1999), Okoh and Akintola (1999), Peterson (2004), Oladapo *et al.*, (2007), Akpan and Aya (2009), Nuhu *et al.*, (2009), Ugwamba and Okoh (2010), Obayelu and Salau (2010), among others. These studies concentrated on staple foods, cowpea and vegetables in specific location. Also some of these studies employed methods like correlation analysis, trend and time series analyses, co-integration analyses, granger causality and error correction model. There was little information on spatial and temporal price efficiency analysis in the North-West Nigeria. The following research questions were addressed:

i. What are the socio-economic characteristics of food grains marketers (Wholesalers) in the study area?

ii. What is the marketing margin of food grains?

iii. What is the trend in the prices of selected food grains?

iv. What are the inter-market price differentials in relation to transportation and other transaction costs?

v. What is the significance of storage cost as a factor in explaining seasonal price variation?

vi. What are the constraints to food grains marketing in the study area?

1.3 Objectives of the Study

The broad objective of the study is to analyze spatial and temporal price efficiency of some selected food grain marketing in three states of North West Nigeria. The specific objectives are to:

i. describe the socio-economic characteristics of food grains marketers (Wholesalers) in the study area.

ii. determine the marketing margin of food grains markets.

iii. describe the trend in the price of some selected food grains markets.

iv. estimate inter market price differentials in relation to transport and other transaction costs.

v. examine the relationships between the storage cost and the seasonal price variation;

vi. describe the constraint to food grains marketing in the study area.

1.4 Justification of the Study

The importance of agricultural marketing cannot be overemphasized. It brings about specialized production for better skill and efficiency thereby providing opportunities for exchange of goods and services (Olukosi and Isitor, 1990). The food grain marketing particularly in the Northern part of the country as a source of employment, income generation and source of livelihood cannot be overlooked. Understanding of price spread in particular space/locations will enable us to know efficiency of the market system in that area.

Therefore, analyzing the price efficiency of food grain distribution and the functioning of the food grain markets is important issues that need to be looked into. Since price varies almost throughout time and space and then understanding the trend of such variation is essential for good planning by the producers, marketers, consumers and policy makers. Study of this nature will specifically estimate the inter-market price variation in relation to transportation and other handlings costs and examine temporal price variation in relation to storage cost and suggests policy measures that could improve temporal and spatial price efficiency of agricultural markets in the study areas.

Findings from this study will help the policy makers, traders, and researchers in understanding the price efficiency and constraints to food grain marketing in the study areas. It will also add to the existing knowledge in spatial and temporal price efficiency in the country

CHAPTER TWO

LITRATURE REVIEW

2.1 Agricultural Marketing

According to Subba *et al.,* 2004, agricultural marketing implies selling of goods and services by the farmers and ranchers. It includes various functions; assembly, transportation, storing, buying, selling, standardization, grading, processing, sales promotion, etc. In general, marketing is the performance or operation of various business activities, which direct the goods and services from the producers to the ultimate consumers. In Agricultural marketing the starting point is the farm or ranch and it is basic source of market supply. The marketing process begins at this point and continues up to the point of final consumption. We have basically two markets i.e., input market and output market. The input market supplies various inputs from the manufacturing firms to the farms and ranches. Output market deals with various activities of the crops and livestock products in their marketing channels.

2.1.1 Role of agricultural marketing

According to Subba *et al.,* 2004, the welfare point of view of farmers, consumers and middlemen; agricultural marketing in agricultural development cannot be overemphasized.. The producer's share in the customer's naira for a commodity is based on the development of marketing system in the economy. The higher their share, the greater would be the welfare to the producers. This depends upon the marketing system, market information and marketing facilities available in the country over time and space. Consumers get maximum welfare through marketing activity.

The consumer's needs and desires are satisfied if the supply of the commodities is ensured to the consumer with normal prices without much price risk. This is possible only when the markets are efficient in supplying the needed commodities to the consumers. For majority of the middlemen marketing is a source of livelihood. The greater the development of marketing system the more would be the involvement of middlemen in the marketing of goods and services. Middlemen wish to obtain higher margin for their marketing services. Hence, an efficient marketing system should always direct towards bringing the welfare to all these categories. It is from this point of view that marketing has become an important and integral part of economic activity and depends mostly on the magnitude of modern production technology. Therefore, market policy as an integral part of agricultural development policy should be revised from time to time, keeping in view of the needs of the economy that are desired by the producers, consumer, and middlemen.

2.1.2 Scope of agricultural marketing

Subba *et al.,* 2004, explained that the scope of the field of marketing can be examined from five angles viz, producers', consumers', societal, traders' and government role. This will be explained as thus:

i. **Farmers' interest:** Farmers as the main resources users are always on the look for the most rewarding benefits in farming. An assured market environment for the products enclaves the spirit of the farmers to use the resources most judiciously. Thus, a healthy marketing system acts as an incentive for the farmers to use the resources prudently. Thus efficient input

marketing and output marketing systems are indispensable to bring desired level of welfare to the farmers.

ii. **Consumers' interest:** Marketing is the system that facilitates the movement of farm commodities from production centres to consumption centres. Thus it provides scope to the consumers to choose farm commodities of their choice to satisfy their needs. Consumers' welfare is brought about through increased marketing output by following efficient methods of marketing

.

iii. **Society's interest:** It is extension of individual consumer's interest. When the consumption requirements are met by an effective marketing system, society at large gets benefit in this process. It enhances the standard of living of the people. Society's resources are distributed efficiently among population in the desired direction. That is to say people's welfare is directly influenced by the efficient marketing system. Marketing is a source of livelihood to several people. An efficient marketing system also brings in price stabilization.

iv. **Traders' interest:** Market intermediaries or middlemen, are those functionaries apart from the Government who facilitate the movement of the products. They may be wholesalers or commission agents or retailers, etc. through the process of marketing they not only fulfil the needs of the producers and consumers, but also in the process make out their living.

v. **Government interest:** Government as a custodian of people's welfare has to perform certain functions. These include the procurement of food grains for the maintenance of butter stocks as well as meet the public distribution

system through purchases by FCI. Government activities are also evident from the marketing assistance rendered by Green Revolution; Operation feed the Nation; Farm Settlement Scheme (SSS); Agricultural Development Projects (ADPs); Marketing Board (MB) and the current Agricultural Transformation Agenda (ATA). Government regulates marketing activities through various legislations and marketing policies. Regulated markets are created to check the malpractices of middlemen and bring about efficiency in various marketing operation. Government facilitate any marketing function to be performed efficiently keeping in view of the welfare of producers, consumers and stabilization.

‘

2.2 Food Grains Marketing

Food grains are an important element of agricultural commodities. Marketing of grains is therefore key to the success of many farmers and commodity marketing organizations. The principal players in food grain marketing systems are producers, Village Merchant, Wholesalers, food Grains Corporation, Civil Supply Enterprise, Retailers, Fair Price Shop and Consumers. Figure 1 shows a typical food grain marketing system in the study area.

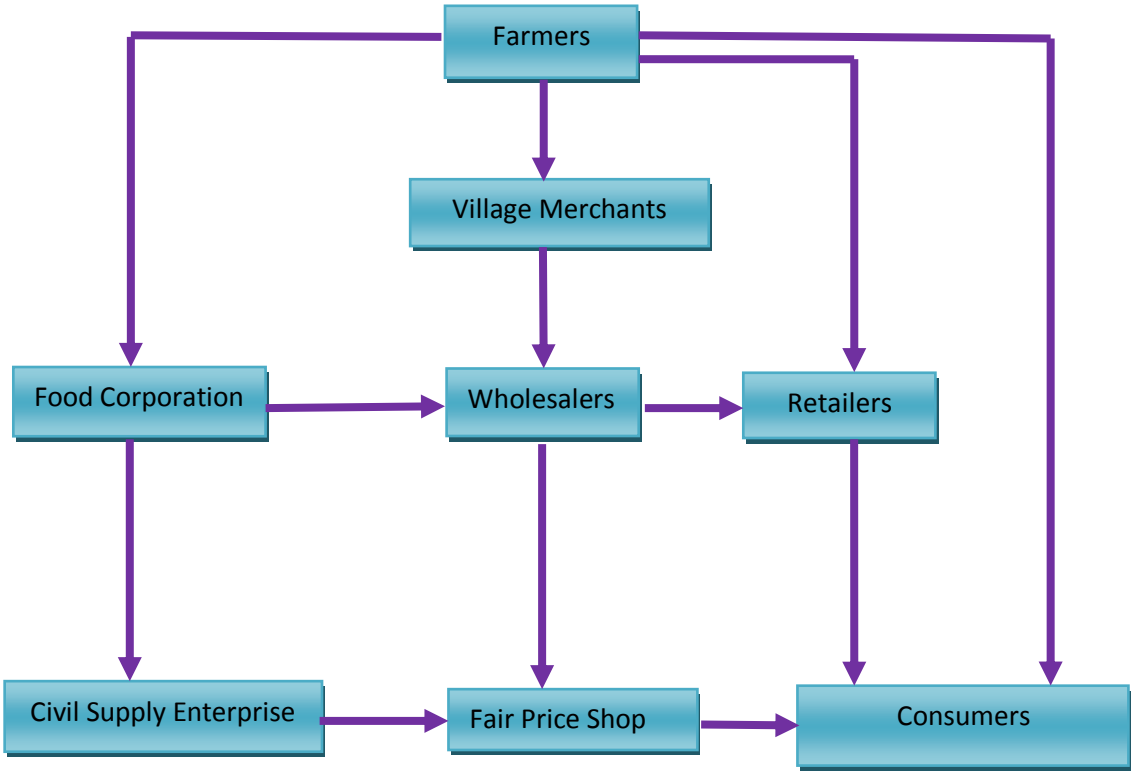


Figure 1: A typical food grain marketing system.

2.3 Marketing Margin

Marketing margin represents the difference in price paid to first seller and that paid by the final buyers (Dittoh, 1994). The difference between the producer price and the final consumer price, it is a measure of total value added in the marketing process. Marketing margin mostly governed by the demand for, and supply of marketing services. This margin can be measured in monetary terms. It can also be expressed either in cash or as a percentage of the wholesalers cost. Margin indicates the relative cost of marketing at a particular time. Marketing margin may also be define as alternatively as a difference between the price paid by consumer and that obtained by producers, or as the price of a collection of marketing services which in the outcome of the demand for and supply of such services. Under the first definition, a marketing margin is simply a difference between the primary and derived demand curves for a particular product.

Primary demand is determined by the response of the ultimate consumers. Empirical estimates of primary demand functions are usually based on retail price and quantity data. Derived demand is based on price-quantity relations which exist either at the points where they are purchased by wholesalers or processors

2.3.1 Marketing margin model

This model developed by Kohl (1985), was used to measure the difference in the price paid by wholesaler as compared to the price received by producers in food grain marketing across the investigated markets.

The model is computed as:

MM= WP – PP − 2.1

Where

MM= Marketing margin

WP= Wholesaler' Prices

PP= Producers' Prices

The rule of thumb is that:

A high margin between the producer's price and wholesaler price is an indication of an inefficient marketing system while the lowest margin indicates efficiency in the marketing system. In an efficient marketing system, the margin should be a function of transportation and other transaction cost in carrying food grains from producers to the wholesalers.

2.4 Spatial Variation in Food Grain Prices

Rashid and Minot (2009) were of the option that the patterns of spatial variation in food prices in a country depended partly on whether or not the commodity was internationally traded. According to them:

For non tradable food commodities, areas producing large surpluses of the commodity (those with good agricultural potential relative to the size of the population) tend to have the lowest prices. In contrast cities and other deficit areas have higher food prices in order to cover the cost of shipping food grain from the surplus zones.

For tradable commodities, prices generally depend on distance from the point of entry or exit. Imported food will be least expensive near the port of entry or along the main transport routes. For example in sub-Saharan Africa rice and wheat are generally least expensive at the port city or in places with good market access. Since transport costs are a major factor in trade and marketing then, spatial arbitrage refers to the process in which traders buy in low price locations and sell in higher priced locations. In competitive markets, spatial arbitrage has three implications: Spatial arbitrage ensures that the price difference between two markets will be, in the long-run, no greater than the transport cost, defined as the full cost of shipping the commodity from one market to another including profit and compensation for risk.

If the difference between the price in the market A (P_{α}^{A}) and in market B (P_{α}^{B}) is greater than the full cost of transportation between the two markets (C), including taxes, risk premium and normal profit, then trade will be profitable. Divergence in prices occurs because the good are not competitive. In other words, if

$$P_B^{\alpha} - P_A^{\alpha} > C \quad \text{---------- 2.2}$$

then it will be profitable to ship the commodity from A to market B. Trade will reduce the supply and raise the price in the exporting market (market A) and increase the supply and reduce price in the importing market (market B), thus causing the price in the two market (P_A and P_B) to move toward each other. Equilibrium is reached when:

$$P_B - P_A \quad \text{---------- 2.3}$$

Where

$$P_B \leq P_B^{\alpha} \; and \; P_A \geq P_A^{\alpha} \quad \text{----------2.4}$$

In this situation, any small change in the price in one market would be reflected in an equivalent change in the price of the other market. On the other hand, if the difference between the price in market A and in market B is less than the full cost of transportation, then it is not profitable to trade between the two markets, it means there is price convergence due to competitive nature of the commodity in the markets. Trade will remain unprofitable if prices remain in the following ranges:

$$P_A + C > P_B > P_A - C \quad \text{----------2.5}$$

This implies that:

$$P_B + C > P_A > P_B - C \quad \text{----------2.6}$$

Secondly, spatial arbitrage implies that, if there is a flow between two markets the price difference will be approximately equal to the transportation cost. To keep the flow going, the price difference must be larger enough to cover the cost of trading. And finally, spatial arbitrage implies that, if the price difference between two markets is less than transport costs, there will be no private trade of the commodity between the two markets.

2.4.1 Spatial Price Model

This model describes price relation among the factors that cause prices in one area to change in relation to those in another. This model is usually derived under the assumption of perfect competitive market model. The basis for this assumption is that, if regional price differences exceed transfer costs, buyers would be motivated to buy and transport grain from low price areas to those with high price and this will eventually cause price in the supplying areas to increase and those in the importing areas to decrease to a level at which price differences no more exceed transfer costs (Tomek and Robinson 1981).

On the basis of the above hypothesis and following the analytical approach used by Hays and McCoy (1977) in their study of the spatial performance of markets in Northern Nigeria, a comparative analysis of expected and actual inter-market price differences was attempted for selected crops and markets using monthly average of wholesale price data for the period of 96 months.

The spatial price efficiency model is specified as:

$$PP_{ij} = P_i - \left(HC_{ji} + TC_{ji} + AS_{ji}\right) \quad \text{---------- 2.7}$$

Where:

PP_{ij} = The calculated parity price of one ton of grain from the i^{th} market (Urban Market) in relation to the j^{th} markets (supply markets).

P_i = The actual wholesale price of one ton of grain at the i^{th} market.

HC_{ij} = Handling costs involved in moving one ton of grain from the j^{th} to the i^{th} market.

TC_{ij} = Transport cost for moving one ton of grain from the j^{th} the i^{th} Market.

AS_{ij} = The charges for the assemblers' service in moving one ton of grain from the j^{th} to the i^{th} market.

The actual price spread between any two markets would be:

$$PS_{ij} = PP_{ij} - P_j \quad \text{---------- 2.8}$$

Where:

PS_{ij} = The price spread for one ton of grain between the i^{th} and the j^{th} market.

P_j = The actual wholesale price of one ton of grain in the j^{th} market.

In a perfectly competitive market, where grain was moving from j^{th} to i^{th} market, the parity price (PP_{ij}) would always be equal to the actual price (P_j) and the price spread (PS_{ij}) will be equal to zero (Hay and McCoy, 1977).

2.5 Temporal Variation in Food Grain Prices

Minot (2009) explained that the variation in Food grain prices over time (temporal variation) also depends on whether or not the commodity is internationally traded:

For tradable food commodities, the variation in price over time is largely determined by world prices, trade policy, and the exchange rate, if trade policy and the exchange rate remain unchanged, the domestic price of a tradable commodity will generally track the international price of the commodity. For non-tradable food commodities, the variation

in prices over time is primarily caused by the seasonal harvest calendar and by weather-related differences in production from year to year. Seasonal prices are lowest during the harvest and rise throughout the post-harvest period in order to cover the cost of storage. Similarly, year-to-year variation in food grain prices is inversely related to the harvest. Because both farmers and consumers can switch between food grain prices in response to price variation, the prices of different food grains often move together over time.

Temporal arbitrage where refers to the process of storing a commodity when the price is low in order to sell it when the price is high. The implication of temporal arbitrage are quiet similar to those of spatial arbitrage: First, temporal arbitrage ensures that the expected price increase between two time periods will be, in general, no greater than the full cost of storage, including profit and compensation for risk.

If the expected price increase were temporarily greater than the storage cost, traders would have an incentive to buy and store more of the commodity, thus raising the current price (when the commodity is less scarce) and lowering the expected later price (when it is more scarce). This reduces food grain variability over time. Secondly, temporal arbitrage implies that, if there is storage between two time periods, the expected price increase will be approximately equal to the storage cost. To maintain the incentive to store, the monthly price increase must be enough to cover the monthly cost of storage. And finally, temporal arbitrage implies that, if the expected price increase from one time period to another is less than storage costs, there will be no storage undertaken by private traders because storage would not be profitable.

2.5.1 Temporal price model

This model has been used by many empirical studies to test the performance, structure and price efficiency of food grain marketing such as Hays and McCoy (1977), Nuhu et al., (2009) and Gebremeskel (1998). This model describes price relation among the factors that cause prices in one period to change in relation to those in another. Due to the seasonality of grain production, prices are normally expected to be low during the harvest season and to rise afterwards up to the next harvest as a function of costs of storage.

Under competitive situations, the seasonal price differences should be equal to the storage costs incurred between the time of harvest and the subsequent points in the year (Hays and McCoy 1977). Thus, it is assumed that grain is allocated throughout the year by the relationship of current and expected prices to storage costs including direct costs of warehouse rent, labour, interest on capital invested in inventories, risk, and normal profit. If seasonal price differences are over and above storage costs and normal profit, this may indicate the existence of some degree of inefficiency in storage (Tomek and Robinson 1981).

In economic theory, there should be parity between post-harvest price rise and cost of storing the grains for a perfectly competitive market. However, if a price rise is greater than cost of storing grains; it implies an imperfect and inefficient market which gives room for traders making normal profit (Hays and McCoy 1977).

The temporal price efficiency model is specified as follow:

$$E(P_{ti}) = P_{to} + t(R + I + S + D) \quad \text{---------- 2.9}$$

Where:

$E(P_{ti})$ = Expected price per ton of stored grain in ith month.

t = time in months; i = 0, 1, 2,…….11 months.

P_{to} = Price of one ton of grain stored at harvest; i.e. t = 0.

R = Rent per ton of grain stored.

I = Interest on capital needed for one ton of grain, estimated at one percent per month (Hays, 1977: 157).

S = Cost of storage chemicals used for storing one ton of grain.

D = Depreciation on sacks used in storing one ton of grain estimated to be ₦5 per month (Hays, 1977).

The net seasonal rise in price (NSRP) for any period is:

$$NSRP_{ti} = P_{ti} - E(P_{ti}) \text{ ------------------------------ } 2.10$$

Where

$NSRP_{ti}$= Net seasonal rise in price in month i.

P_{ti}= price of one ton of grain stored in month i.

$E(P_{ti})$ = Expected price per ton of stored grain in ith month.

In a perfectly competitive market, it is expected that seasonal rise in the price of stored grains should be equal to storage cost (Hays and McCoy 1977).

2.6 Theoretical framework

We adopted the cobweb theory for the purpose of this study:

2.6.1 Cobweb theory

The cobweb theory forms the basis of this research work because it assumes that the commodity markets are not always in equilibrium. Agricultural markets are thought to be suitable for the application of cobweb theory, since there is a lag between planting and harvesting. Suppose that as a result of unexpectedly bad weather, farmers go to market with usually small crops.

This shortage is equivalent to a leftward shift in the market's supply curve, which results in high prices. If farmers expect these high conditions to continue, then in the following year, they may produce more than what is demanded and prices will fall. But if they expect low prices to continue, they will decrease their production for the next year, resulting in high prices again. The cobweb model is a special case of fluctuation in agricultural prices. Therefore, the decision by producers to produce is based essentially on the current market price, rather than the expected price when the commodity reaches the market (Dahiru Sulaiman, 2013).

The model is therefore base on the following assumptions:

i. Producers based their production plan of the previous year's prices.

ii. Consumers based their purchase on current prices; there is no artificial effort to influence price or output.

iii. Producers do learn hard from their markets regarding unfulfilled price expectation

The nature of the model is illustrated in figure 2 below.

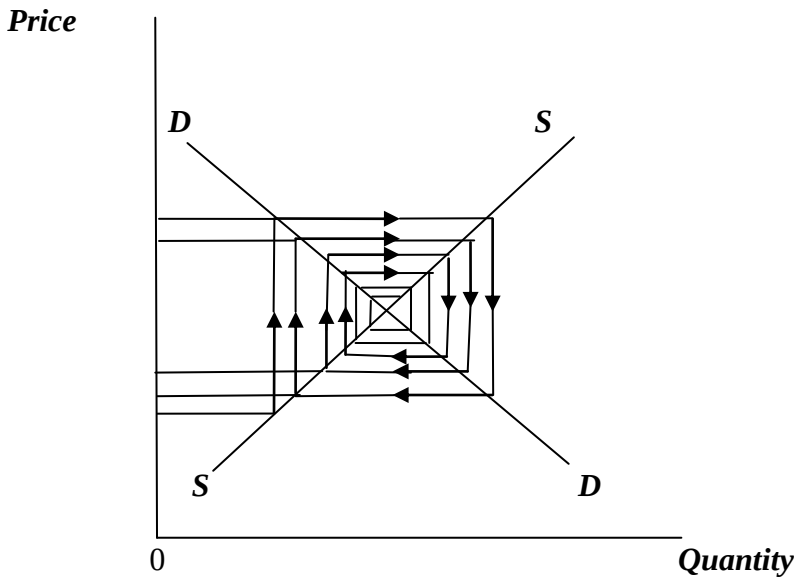


Figure 2: Cobweb Model

The initial assumption is that the producers sell their agricultural commodities at the low price ${}^{o}p_{to}$ at period t_o. Since they believe that this low price will continue into period t_1, they curtail supply. The result is that in t_1, the price rises to ${}^{o}p_{t1}$. Again, producers believe that price ${}^{o}p_{t1}$ will prevail in the next period. So, they expand production, in action which brings down the price to ${}^{o}P_{t2}$. Expecting the price ${}^{o}P_{t2}$ to prevail in next season, producers reduce supply, as a result of which the price goes up in ${}^{o}P_{t3}$. As they base production on ${}^{o}P_{t3}$, the producers expand output and cause the price to fall to ${}^{o}P_{t4}$. In the diagram the price elasticity of demand and supply of agricultural product, are assumed equal. This is why we have the price moving towards the equilibrium at which it converges (Dahiru Sulaiman, 2013).

The model postulate a situation in which there is an immediate response to a change in price on the demand side but a delayed, or lagged, response on the supply side. This reasonable assumption since demand decisions are less concerned with immediate physical problems, whereas supply decision are more likely to having the goods available in the market. We may state the situation in the mathematical form as follows:

$$D_t = f(P_t) \quad \text{---------- 2.11}$$

$$S_t = f(P_t) \quad \text{---------- 2.12}$$

Where D_t represent the quantity demanded and S_t the quantity supplied. Both are functions of price, but the quantity demanded is determined by the current price, whereas the quantity supplied depends on the price in the preceding period. Price in period t is determined by market clearance when D=S.

If we stipulate linear functions, we have

$$D_t = \alpha + \alpha P_t \quad \text{----------2.13}$$

$$S_t = \beta + bP_{t-1} \quad \text{---------- 2.14}$$

When the market is functioning efficiently, the equilibrium price is p, but if, because of imperfect information or other reasons, this price is not achieved, the difference between the actual and equilibrium price is given by:

$$P_t = P_{t-1} - P \quad \text{----------2.15}$$

Similarly, the equilibrium quantity is Q, and the difference, in non equilibrium situations, is:

$$Q_t = Q_{t-1} - Q \quad \text{---------- 2.16}$$

For any commodity which takes some time to produce, the decision about the quantity to be supplied at any time t must have been based on knowledge of prices at time t-1 and mere guesses about prices at time t. agricultural production provides one of the best of the best example of supply function of this form, that is:

$$Q_t = f(P_{t-1}) \quad \text{---------- 2.17}$$

Once the element of time is introduced, there is no assurance that any equilibrium price and quantity will exist in the market.

2.7 Pricing Efficiency

Pricing efficiency analyses how the wishes of final consumers are transmitted through the marketing system as manifested in the resultant prices at the various levels in the system. Pricing efficiency studies attempt to appraise the system by comparing actual prices with the ones that are generated by the perfectly competitive market (Bressler and King, 1970). Under this theoretical construct, we expect that an efficient market will establishes prices that are interrelated through space by transportation costs, through form by costs of processing, through time by costs of storage, and through competition of middlemen by the size of their net margins. Pricing efficiency enable us determine the mark up earnings accruing to marketing intermediaries as well as determining the extent of marketing efficiency (Oladapo et al., 2007). This research will deals with all aspects of pricing efficiency except those of form and processing costs.

The research presents the result of three analyses that have been made to indicate the level of competitiveness in the marketing system. Firstly, storage costs are compared with seasonal price rises to see if the market is competitive. The theory is that in competitive markets, seasonal price rises should be commensurate with storage costs. Secondly, the costs of transportations are compared with price differences between markets to see if the prices are in accordance with competitive behaviour so that price differences do not greatly exceed transport costs. The third, analysis compares the margins received by traders of the selected food grain trade between the selected markets under study. In a competitive market, the theory is that such margins should be low which indicate efficiency in the market system.

2.8 Empirical Studies on Marketing Margin, Spatial and Temporal Price Analysis

Akpan *et al.,* 2009, in their studies of monthly price analysis of cowpea (beans) and maize in Akwa Ibom State Southern, Nigeria revealed that, the trend in price of Maize and Beans in rural and urban markets showed positive significant association with time in Akwa Ibom State. This implies that, changes in price of maize and Beans in rural and urban markets is influenced by time. Prices of maize in rural and urban market have exponential growth rates of 0.60% and 0.50% respectively. In the similar way, about 0.90% exponential growth rate was identified for both rural and urban price of Beans.

These results suggested that there are noticeably dispersions between prices of Maize in rural and urban markets in the study area; whereas the dispersion in prices of Beans showed minimal or insignificant difference between the two spatial markets. The result indicates that, there is possibility of market integration between the rural and urban prices of Maize and Beans in Akwa Ibom State.

The nature of exponential growth in each price variable investigated revealed that over time the price of Maize in rural and urban markets showed insignificant increase. On the other hand, price of Beans in the rural and urban markets exhibited significant relationships with increase in time. This implies that, the price of beans in rural and urban markets increases at the increasing rate over time. These results are in consonance with the research report of Amusa (1997), who asserted that, agricultural commodity prices experienced increase fluctuations in their prices. Akpan *et al.,* (2014), made a research report and also supported increased fluctuation of grains prices in Southern Nigeria.

Hays and McCoy (1977), examined spatial and temporal aspects of marketing efficiency for the traditional marketing system for millet and sorghum in Northern part of Nigeria. They observed that positive price spreads is due to an erratic nature of supply, an inadequate dissemination of information on prices and supply in the various markets and lack of specialization in trade by traders. Storage Operations were considered to be the reason for inter-temporal price increases. The authors point out that lack of market integration among the fifteen urban locations studied resulted in spatial price differentials that in some cases exceeded transfer costs.

Nuhu *et al.,* (2009), also analyzed spatial and temporal price efficiency associated with food grain marketing in north-eastern Nigeria. They discovered that there was an excessive inter-market price increase, which suggests market imperfections resulting from collusive behavior of middlemen.

De Groote *et al.,* 2005, analyzed spatial and temporal volatility of maize prices in Kenya: A preliminary analysis provides that maize is the major food crop and an important cash crop in Kenya. But prices fluctuate over time and space. Fluctuation over time causes farmers price insecurity which hampers investment decisions, while fluctuation over space, combined with limited knowledge of that fluctuation, reduces market opportunities for their surplus. Also, the results show a clear negative trend, indicating that real maize prices have decreased over time, on average by 4% per year.

Badiane and Shively (1998), examine the degree of integration and the speed of adjustment in Ghanaian maize prices. The authors found that maize prices in both deficit markets are relatively well integrated with maize prices in Techiman, the surplus market. However, the relationship is closer between Techiman and Accra than between Techiman and Bolangtanga, presumably due to the shorter distance between them.

Abdulai (2000), uses a threshold co-integration model to examine the relationships among maize prices in the same three markets in Ghana. The analysis uses monthly wholesale maize data over 1980-1997 for Accra, Techiman, and Bolgatanga. The study found that prices in Accra respond more quickly to changes in Techiman than do prices in Bolgatanga, reflecting the fact that Accra is closer and a more active market.

Kuiper *et al.,* 2003, focuses on the issue of price leadership between retail and wholesale prices in Benin in order to test the common assumption that retail prices follow the wholesale prices in the same market. They use retail and wholesale price data from periodic markets operating every four day in five markets Cotonou, Bohicon, Azové, Dassa, and Kétou. The tests for co-integration indicate that retail and wholesale prices are strongly co-integrated. They found that in three of the four markets, the wholesale price in each period is significantly affected by the retail price in the previous

period, but not the other way around. These markets include the two large urban areas: Cotonou and Bohicon. In only two markets do wholesalers play a price leadership role. The authors interpret this to mean that wholesalers can only influence prices when they carry out inter-city trade and thus have alternatives to selling to retailers.

According to Tomek and Robinson (1981), the seasonality of grain production, prices are normally expected to be low during the harvest season and to rise afterwards up to the next harvest as a function of costs of storage. Under competitive situations, the seasonal price differences should be equal to the storage costs incurred between the time of harvest and the subsequent points in the year. Thus, it is assumed that grain is allocated throughout the year by the relationship of current and expected prices to storage costs including direct costs of warehouse rent, labor and interest on capital invested in inventories, risk, and normal profit. If seasonal price differences are over and above storage costs and normal profit, this may indicate the existence of some degree of inefficiency in storage.

2.9 Constraints to Food Grains Marketing

Constraints generally refer to the bottlenecks, problems, impediments or eve to smooth conduct of any given operation or activities. The functioning of the food grains markets in most of the underdeveloped countries, like Nigeria, is constrained by various problems and obstacles such as imperfect market information for buying and selling of food grains; lack of cash and credit availability to finance short-run inventories and processing operations; insufficient facilities for storage and transportation; no uniform system of common grade standards to facilitate trading at a distance; lack of management skills; and unsuitable legal codes to enforce contracts (Barrett, 2001).The common constraints associated with food grain marketing in Northern part of the

country during the period under review include; Transportation problems, inadequate marketing infrastructure, poor storage facilities, inadequate fund for grain marketing, seasonality of food grain produce and lack of uniform measures.

Aidoo *et al.*, 2012, on their work of assessing the performance of the grain legume marketing system in northern Ghana provides the rankings of the main constraints faced by grain legume traders in northern Ghana. The scale for the ranking ranged from very severe (1) to least severe (5). When all traders were put together, the most critical constraints were found to be limited access to credit, high transportation cost, poor nature of roads leading to producing centers and inadequate storage facilities. For soyabeans traders, inadequate storage facility was ranked as the most critical constraint followed by limited access to credit. However, cowpea and groundnut traders ranked limited access to credit followed by transportation challenges (high cost and bad road network).

The fact that cowpea and groundnut traders did not consider storage facility as a major constraint suggests that there may be ready market for these commodities compared to soyabeans. The later has limited usage at the household level and larger volumes are supplied to processing firms in southern Ghana for industrial use. This partly explains why storage facilities may be very critical for the soyabeans trading business.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

This study was conducted in Kaduna, Katsina and Kano States of the North West Nigeria.

Kano State: Kano State is located between latitude 13^0N and 11^0S and longitude 8^0W and 10^0E. The state has a land mass of about 20760km^2 (NARERLS, 2011). Based on NPC (2006), at 2012 the state has a projected population of 11,206,334. The state is considered to be agrarian as more than 65% of the working adults are engaged in farming and related activities as a means of livelihood. The average annual rainfall is 700mm with the mean daily maximum temperature of 350 and 190, respectively. The major crops grown in the state include rice, maize, millet, cowpea, soyabeans, vegetable and groundnut (NAERLS, 2011). Kano is one of the states in the North-West Nigeria that has large urban and rural markets especially for the sales of food grains like Dawanau market.

Kaduna State: Kaduna State is located in the Northern Guinea Savanna ecological zone. It occupies almost the entire central portion of the Northern part of Nigeria and share common borders with Zamfara, Katsina, Kano, Bauchi, Nassarawa and Plateau state. To the southwest the states are border with the Federal Capital territory, Abuja. The global location of the State is between longitude 06^o00 and 09^o00 East of the Greenwich Meridian and also between latitude 09^o00 and 11^o30, north of the equator. The state occupies an area of about 48,473.2 square kilometer.

It has a population of 6,066,562 people (NPC, 2006); and a projected population of 6,527,620 in 2009 and projected also as 74.74 million people in 2013. The major crops grown in the state includes; maize, sorghum, millet, rice, groundnut, cowpea, soya beans etc. Kaduna state also has many well known rural markets for the sales of food grains like Giwa, Pambegua and Ikara markets.

Katsina State: Katsina State covering an area of 23,938 square km is located between latitude $110^{0}08^{0}$N and 130 22^{0}N and longitude 60 52'E and 90 20'E. The state is bounded by Niger Republic to the North, Jigawa and Kano to the east, Kaduna state to the South and Zamfara State to the west. Agriculture is the backbone of the state's economy as 75 per cent of its people are farmers. Katsina state is blessed with abundance agricultural land and a wide range of crops are grown. These include: guinea corn, soyabeans, rice, millet, maize, cowpea, cotton, and groundnut, etc. In addition, the state possesses a large livestock population mainly made up of cattle, goats and sheep. The state has a projected population of 7,452,629 in 2014 from the 2006 figure of 5,792,578 at a growth rate of 3.2 percent per annum (NPC, 2006). Katsina also has some major rural markets for the sales of food grains like Funtua, Dandume and Danja markets.

3.2 Sampling Procedure and Sample Size

Multi-stage sampling technique was adopted for the sample selection. The first stage involved purposive selection of three (3) states; Kano, Kaduna and Katsina for the predominance production of the selected food grain. The second stage involved purposive selection of seven (7) markets which are Dawanau, Giwa, Ikara, Pambegua, Funtua, Dan-dume and Danja markets from Kano, Kaduna and Katsina States respectively based on their interactive participation in marketing of the selected food grains across the region (Dahiru Sulaiman, 2013). Out of these seven markets, Dawanau market was used as the reference market while Giwa, Ikara, Pambeguwa, Funtua, Dan-dume and Danja markets were used as the supplying markets. The choice of Dawanau market as the reference market was based on large supply of food grains to Dawanau market compared to other markets.

The third stage involved random selection of 15% of the sampling Frame (1346) of the food grains marketers obtained from the list of Marketers' (wholesalers), through Associations/Union of the marketers in the seven markets. A total of two hundred and two (202) wholesalers constituted the sample size for the study. The sampling procedure employed in this study is presented in Table 1.

Table 1: Sampling frame and sample size of wholesalers in kano, kaduna and katsina states

States	Selected Reference Market	Selected Supplying Markets	Sampling Frame	Sample Size 15%
Kano	Dawanau		305	46
Kaduna		Giwa	195	29
		Ikara	165	24
		Pambegua	180	27
Katsina		Funtua	191	29
		Dandume	143	21
		Danja	167	25
Total	**1**	**6**	**1346**	**202**

Source: Reconnaissance Survey, 2014**.**

3.3 Method of Data Collection

Both primary and secondary data were used for the study. Primary data were obtained through structured questionnaires and focus group discussion to generate the information required for the study. The data collected include (a) Marketers' socio-economic characteristics such as age, sex, level of educational, marketing experience and marital status (b) Prices of maize, mill rice, cowpea and soyabeans were used, (c) Harvest prices, costs of storage, assemblers' charges, transportation and other handling cost.(d) Constraints faced by the marketers in the North west Nigeria. These data were obtained from selected members of wholesalers' association/unions identified during reconnaissance survey in the study area.

Secondary data covered the wholesale monthly prices for 96 months (2007-2014) which were obtained from the Agricultural Development Programme Office (ADPs) of the three selected states and National Agricultural Extension and Research Liaison Service (NAERLS), A.B.U Zaria. The data collected focused on the following grains: Maize, Rice, Cowpea and Soyabeans which are some of the major food grains produce and traded in the study area and where detail prices over time period are available.

3.4 Analytical Techniques

3.4.1 Descriptive statistics

Descriptive statistics such as percentages, frequency and distribution tables were used to achieved objectives (i), (iii), and (vi).

3.4.2 Marketing margin model

A marketing margin model developed by Kohl (1985), was used to measure the difference in the price paid by wholesaler as compared to the price received by producers in food grain marketing across the investigated markets. This was used to achieve objective (ii) of the study. The marketing margin was then computed as:

MM= WP – PP – 3.1

Where

MM= Marketing margin

WP= Wholesaler' Prices

PP= Producers' Prices

The rule of thumb is that:

A very wide margin between the producer's price and wholesaler price is an indication of an inefficient marketing system. In an efficient marketing system, the margin should be a function of transportation and other transaction cost incurred in carrying food grains from producers to the wholesalers.

3.4.3 Spatial price models

A model of spatial price relationship developed by Hays and McCoy (1977), was adopted to achieve objective (iv). This model was used to look at price spread between different locations. Dawanau market was considered as the central market (a border town and consuming centre) while Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets were considered as rural supplying markets. Parity price or expected price was calculated at Dawanau Market.

The price spread was then computed as follows:

$$PP_{ij} = P_i - \left(HC_{ji} + TC_{ji} + AS_{ji}\right) - 3.2$$

Where:

PP_{ij} = The calculated parity price of one ton of grain from the i^{th} market (Urban Markets: i.e. Dawanau) in relation to the j^{th} markets (1,2,3,4,5 and 6 which are Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets respectively).

P_i = The actual wholesale price of one ton of grain at the i^{th} market.

HC_{ij} = Handling costs involved in moving one ton of grain from the j^{th} to the i^{th} market.

TC_{ij} = Transport cost for moving one ton of grain from the j^{th} the i^{th} Market.

AS_{ij} = The charge for the assemblers' service in moving one ton of grain from the j^{th} to the i^{th} market.

The actual price spread between any two markets would be:

$$PS_{ij} = PP_{ij} - P_j \quad \text{---------- 3.3}$$

Where:

PS_{ij} = The price spread for one ton of grain between the i^{th} and the j^{th} market.

P_j = The actual wholesale price of one ton of grain in the j^{th} market.

In a perfectly competitive market, where grain was moving from j^{th} to i^{th} market, PP_{ij} would always be equal to P_j and the price spread will be equal to zero (Hay and McCoy, 1977; Nuhu *et al.,* 2009)

The rule of thumb is that:

i. If the price spread is positive, the traders are making more than normal profit.

ii. If the price spread is zero, the traders are making just normal profit, which can only exist for perfect and efficient market.

iii. If the price spread is negative, the traders are making a loss.

3.4.4 Temporal price model

In economic theory, there should be parity between post-harvest price rise and cost of storing the grains for a perfectly competitive market. However, if a price rise is greater than cost of storing grains; it implies an imperfect and inefficient market which gives room for traders making more than normal profit. This was used to achieve objective (v) of the study.

For a perfect market, the expected seasonal price increase is calculated as:

$$E(P_{ti}) = P_{to} + t(R + I + S + D) \quad \text{---------- 3.4}$$

Where:

$E(P_{ti})$ = Expected price per ton of stored grain in i^{th} month.

t = time in months; i = 0, 1, 2,…….11 months.

P_{to} = Price of one ton of grain stored at harvest; i.e. t = 0.

R = Rent per ton of grain stored.

I = Interest on capital needed for one ton of grain, estimated at one percent per month (Hays, 1977: 157).

S = Cost of storage chemicals used for storing one ton of grain.

D = Depreciation on sacks used in storing one ton of grain estimated to be ₦5 per month (Hays, 1977).

In a perfectly competitive market, it is expected that seasonal rise in the price of stored grains should be equal to storage cost.

\
The net seasonal rise in price (NSRP) for any period is:

$$NSRP_{ti} = P_{ti} - E(P_{ti}) \quad \text{---------- 3.5}$$

Where

$NSRP_{ti}$= Net seasonal rise in price in month i.

P_{ti}= price of one ton of grain stored in month i.

$E(P_{ti})$ = Expected price per ton of stored grain in i^{th} month.

The rule of thumb is that:

1. If the net seasonal rise in price is significantly greater than storage cost, the market is an imperfectly competitive market and inefficient pricing system.

2. If the net seasonal price rise is zero, there is existence of perfectly competitive market and efficient pricing system.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Food Grains Marketers

4.1.1 Sex of the respondents

The result of the study in appendix 1 revealed that all the sample respondents in the study area are generally male. This is probably because the selected markets are dominated by Hausas/Fulanis. This implies that the food grain marketing in the study area is mainly a male dominated activity.

4.1.2 Marital status

The result of the study in appendix 1 revealed that all the respondents in the study area are married; none of the traders were single. This is as a result of the domination of Islamic religion (i.e. Muslim) in the study area.

4.1.3 Age distribution of food grain marketers

The result of age distribution of the respondents is presented in Table 2. The study revealed that the food grain marketers were within the active age range of 41-50 years. This implies that the marketers are strong, agile, and active and can participate adequately in marketing activities. This agrees with the findings of Bassey *et al.*, (2013), who conducted a study on rice posited that rice marketers were at their youthful age, a situation which can promote market efficiency. Age has been found to determine how active and productive the head of the household would be (Amaza et al., 2009).

Table 2: Distribution of respondents according to age

Age (years)	Frequency	Percentage
31-40	34	17.3
41-50	104	53.1
51-60	56	28.6
61-70	2	1.0

4.1.4 **Educational level of the respondents**

Education is an important socio-economic factor that influences food grain marketers' decision making because of its influence on marketers' awareness, perception and adoption of innovations that can bring about increase in marketing productivity and efficiency. The result in Table 3 shows that 61% of food grain marketers had no formal education and about 18% of the respondents had only primary education. This indicates that the marketers' western educational level was very low; this is based on the fact that most of these marketers are residing in the rural community of North West Nigeria which is known for poor attitude to western education. This finding is at variance with Amaza (2009), who found that marketers are literate which could have increased their marketing efficiency. Thus, he further stated that literacy level will greatly influence the decision making and adoption of innovation by marketers, which may bring about increase in productivity and efficiency.

Table 3: Distribution of respondents according to level of education

Level of Education	**Frequency**	**Percentage**
No Formal Education	119	60.71
Primary School	36	18.37
Secondary School	34	17.35
Tertiary	7	3.57

4.1.5 Food grain marketing experience

Table 4 depicts the years of experiences of the respondents across the markets studied. Most of the respondents 50% indicated that they have been in the business for twenty one to thirty years (21-30). Those with 11 - 20 years of experiences constituted 42% of the total respondents. The food grain marketers were thus expected to be efficient based on their long stay in the business as Amaza (2009), stated in his study on measuring experience as the greater impacts of marketing objectives are gained through experiences. Thus experience may serve as a useful factor in determining the effectiveness of marketing events among marketers. This is due to the fact that experience creates behavioural confidence in the business and increases buyers – sellers' engagement and stronger relationship.

Table 4: Distribution of respondents according to years of marketing experience

Years of Experience	Frequency	Percentage
1-10	13	6.6
11-20	82	41.8
21-30	97	49.5
31-40	4	2.1

4.1.6 **Sources of finance in food grain marketing**

Table 5 shows the sources of finance in food grain marketing across the investigated markets. The study revealed that majority of respondents 59% financed their business through personal savings and 41% borrowed from friends and relatives. The presence of cheap source of credit through personal effort as well as friends and relative account for the reason why lack of credit was not considered a severe constraint by food grain traders in the study area.

This agrees with the findings of Bassey *et al.*, (2013), who found that most of the grain marketers have their finance through personal savings and does not borrowed from any commercial banks even though his finding varies with this one at the issue of other financial institution.

Table 5: Distribution of respondents according to Sources of Finance

Source of Finance	Frequency	Percentage
Personal Saving	116	59.2
Friends and Relatives	80	40.8
Commercial Bank	0	0

4.2 Analysis of Food Grain Marketing Margin in the study Area

4.2.1 Analysis of marketing margin for maize in the study area

The marketing margin which represents the difference between the wholesalers' prices and the producers' prices is shown in Table 6. The marketing margin was highest for food grains marketers in Dawanau market with ₦ 10,000 per ton of maize. The least value of ₦2,000 per ton was however recorded for market in Pambegua. The average marketing Margin for grains marketers across the markets is ₦6,286 per ton of maize. This implies that lower values of marketing margin are desirable as they imply higher levels of marketing efficiency among the marketers. Although there are variation among the marketers on the basis of the marketing services performed, farmers receive about half of wholesalers' prices of food grain in Nigeria (Adeyokunne, 1980).

Table 7: Marketing margin analysis for maize in the study areas (₦/ton)

Markets	Wholesalers' price	Producers' Price	Market margin
Giwa	40000	35000	5000
Ikara	40000	35000	5000
Pambegua	40000	38000	2000
Funtua	45000	38000	7000
Dandume	40000	35000	5000
Danja	40000	30000	10000
Dawanau	50000	40000	10000
Average	**421,423**	**35,857**	**6,286**

4.2.2 Analysis of marketing margin for mill rice in the study area

Table 7 showed the marketing margin for rice across the selected markets studied. Marketers in Ikara, Pambegua and Dandume markets recorded the lowest margin of ₦10,000 per ton of mill rice. This is against the ₦26,000 margin recorded by the marketer in Dawanau market. The average marketing margin for the rice in the markets is ₦15,000 which is slightly lower than the marginal values in Funtua and Danja markets respectively and greater values in Giwa, Dandume and Pambegua markets respectively. This implies that a fairly moderate margin recorded in Ikara and Dandume markets may have been caused by the series of marketing activities involving in rice and some other food items; and it is also occasioned with the poor marketing system and low production of rice in that particular area.

Table 7: Marketing margin analysis for mill rice in the study areas (₦/ton)

Markets	Wholesaler' price	Producer' price	Market margin
Giwa	115000	100000	15000
Ikara	110000	100000	10000
Pambegua	120000	110000	10000
Funtua	160000	140000	20000
Dandume	120000	110000	10000
Danja	134000	120000	34000
Dawanau	176000	150000	26000
Average	**133571**	**118571**	**15,000**

4.2.3 Analysis of marketing margin for cowpea in the study area

Marketing margin for cowpea across the seven selected markets is presented in Table 8. The study revealed that marketing margin for cowpea marketers across the markets in the study area was least for the market in Funtua with the margin of ₦10,000 per tonne and highest in Dawanau and Ikara markets with the margin of ₦20,000 per ton. The average marketing Margin for cowpea at the markets is ₦16,143 which is slightly higher than the lowest values of Margin recorded for the marketers in Funtua market. The implication of this is that cowpea is most efficiently marketed in Funtua markets than elsewhere in the other markets under study. It has often been observed that the interplay of series of marketing activities courses variation in the marketing margin among the marketers of food grains in the region.

This is in line with the earlier position of Adeyokunne (1980), who noted that factors responsible for high margins include multiplicity of traders, which leads to duplication of functions and the small scale of operation, inefficient processing, price instability, transportation bottle neck and losses due to storage.

Table 8: Marketing margin analysis for cowpea across the markets (₦/ton)

Markets	Wholesaler' price	Producers' price	Market margin
Giwa	130000	115000	15000
Ikara	130000	110000	20000
Pambegua	128000	110000	18000
Funtua	130000	120000	10000
Dandume	130000	115000	15000
Danja	130000	115000	15000
Dawanau	145000	125000	20000
Average	**131857**	**115714**	**16,143**

4.2.4 Analysis of marketing margin for soyabean in the study area

Table 9 showed the value of marketing margin for soyabean across the seven selected markets in the study area. The least value of ₦5,000 per ton was obtained at Danja market and highest for the marketers in Ikara with the margin of ₦20,000 per ton. The average marketing margin for cowpea at the across the markets is ₦13,571 which is slightly higher than the lowest values of margin recorded for the marketers in Danja market. The implication of this is that soyabean is more efficiently marketed in Danja markets than elsewhere across the selected markets under study. This is because the lowest margin gives room for market efficiency and hence leads to high level of profitability.

Table 9: Marketing margin analysis for soyabean across the markets (₦/ton)

Markets	Wholesaler' price	Producers' price	Market margin
Giwa	135000	120000	15000
Ikara	130000	110000	20000
Pambegua	130000	115000	15000
Funtua	135000	120000	15000
Dandume	140000	130000	10000
Danja	130000	125000	5000
Dawanau	140000	125000	15000
Average	**134286**	**120714**	**13,571**

4.3 Trend Analysis of the Selected Food Grain Markets in the Study Area

Price trend helps to predict the future movement of a stock based on past data. It is based on the idea that what happened in the past years gives traders an idea of what will happen in the future. The price trend showed the pattern of price variability of agricultural produce across the markets selected in the study area. One important thing to note is that their pattern of price variation is seasonal in nature. This is clearly shown

in figures 3 to 6 which indicate three periods of price changes namely: the pre-harvest usually called the hunger period, the harvest and post-harvest period.

The figures depict the nature and patterns of the variability of the selected food grain in the selected markets over the specified period of eight years (2007-2014). From the figures, it is evidenced that period of higher prices of the food grain is an indication of periods that the consumers became vulnerable to food insecurity and a period when there was a drastic reduction in their consumption pattern. This is because their purchasing power has reduced while periods of relatively low price is an indication of periods when consumers were food secured due to increase in their purchasing power.

4.3.1 Trend analysis in the price of maize in the study area

Figure 3 showed the visual plot of the monthly average of wholesale prices of maize grain from 2007- 2014 across all the selected markets considered. The prices were characterized by fluctuations with a rise in price of maize in 2008 and 20011which was as a result of food crisis and post - election violence that occurred during the periods. Also, there was a considerable change in 2014 because of the high expectation of political instability and the level of insecurity occurred across the area studied.

The prices were volatile especially in Dawanau market which had the highest price value of ₦60,000 per ton because of international consumers, like Niger, Chad and Cameron, which were coming to buy maize grain in commercial quantities and industries that were consuming it as raw materials coupled with domestic demand which exceeded the supply.

The highest average price across the selected maize markets in the study area was ₦44384 with the maximum price value of ₦57,159 and the minimum price value of ₦20,000. However, on average both the rural (the selected supplying markets) and urban (the reference market) prices of maize exhibited similar pattern of fluctuations throughout the study period. The result implies that, both the rural and urban prices of maize move together in the period of investigation. This indicates that, there is possibility of market integration between the rural and urban prices of maize across the markets studied. Dahiru Sulaiman. (2013), also observed similar behaviour when they studied an empirical analysis of staple food price variability and agricultural sector response to random oil price shocks in Nigeria (1974-2010).

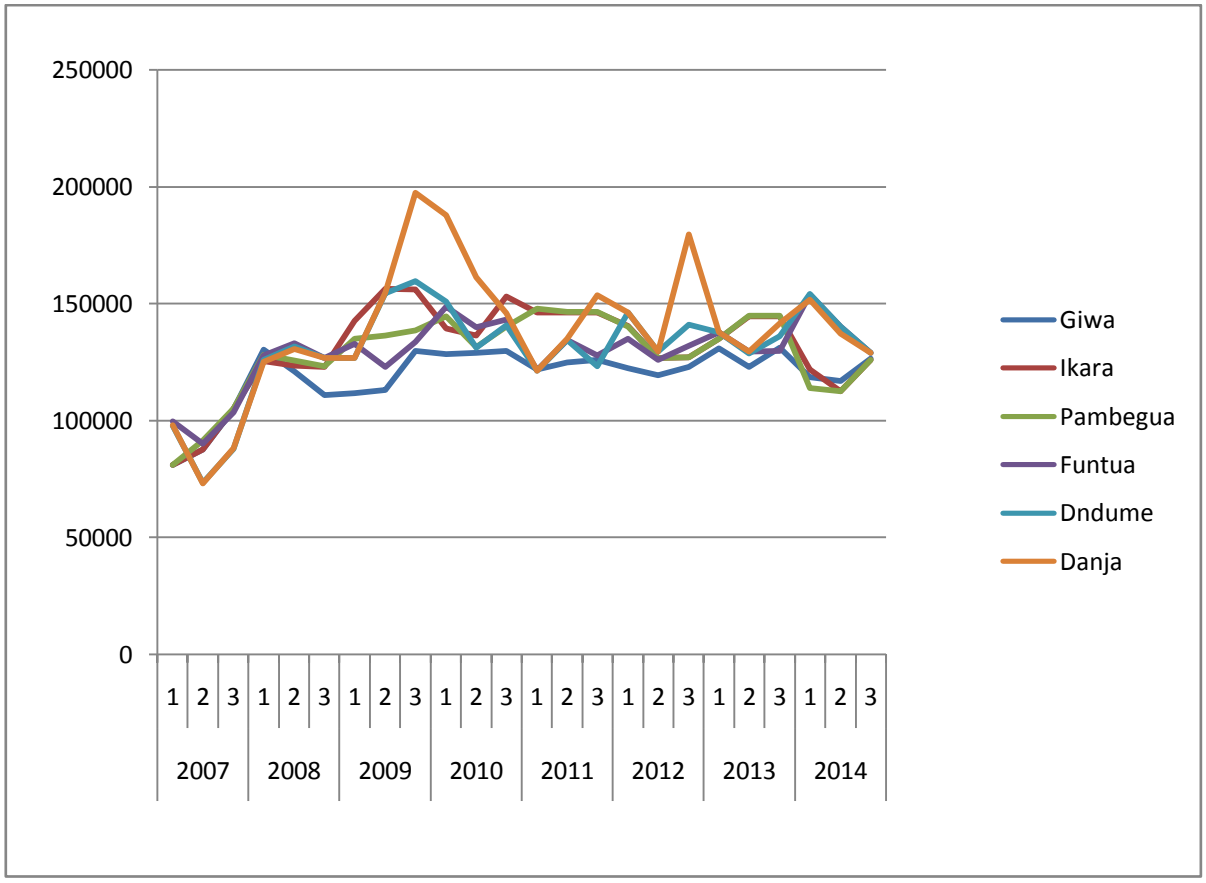


Figure 3: Price Trend for maize Across the Six Supplying Markets

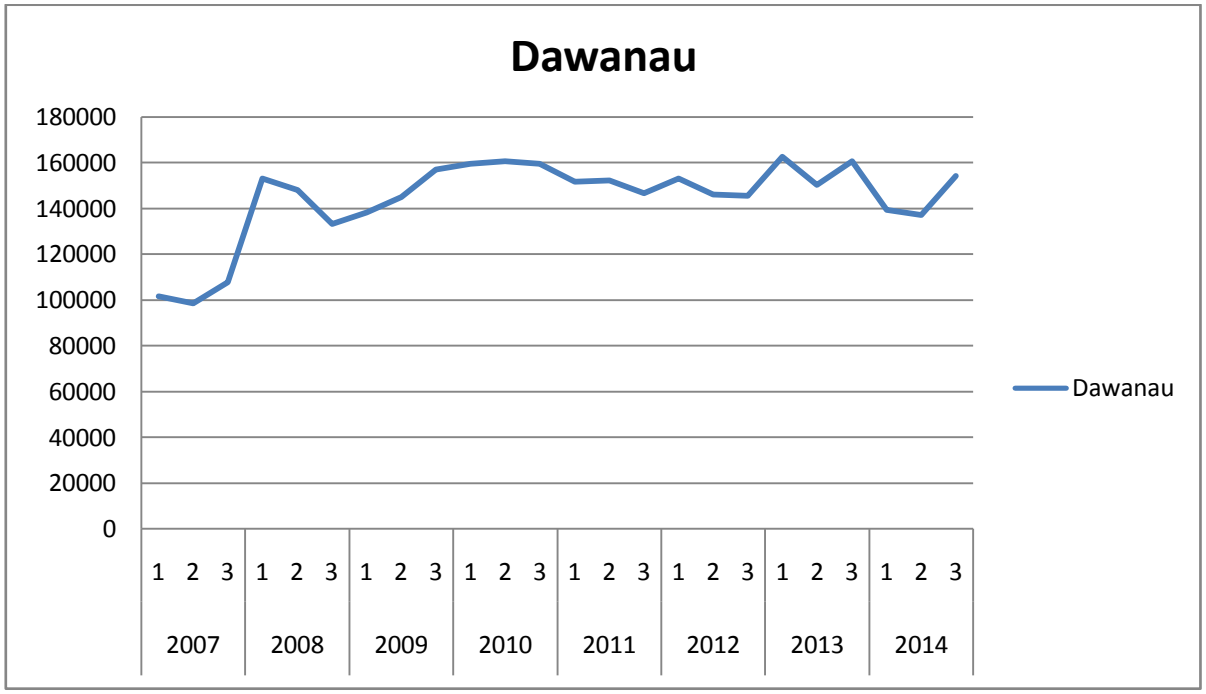


Figure 4: Price Trend for maize Across the Reference or Urban Market

4.3.2 Trend analysis in the price of mill rice in the study area

Figure 4 showed the linear trend of rice prices across the selected markets, the price trend shows undulated fluctuations throughout the study period. Both prices seem to move together in most part of the years except for few noticeably dispersions in 2008, 2011 and 2014 in Ikara and Danja markets. The maximum and minimum selling prices of rice across the markets were ₦148,000 and ₦40,000 respectively. The highest average was ₦108,097 in Ikara market. This implies that the prices in the supplying markets (Giwa, Ikara, Pambegua, Dan-dume, and Danja) were lower than the reference (Dawanau) market in most cases. The plausible explanation for this might be because the quantity of rice supplied from rural markets was minimal due to transportation cost, since the area is located several kilometers away from the principal market. This finding goes in line with that of Akpan *et al.,* (2009), who observed similar behaviour when they studied marketing and price transmission of local and foreign rice commodities in Nigeria.

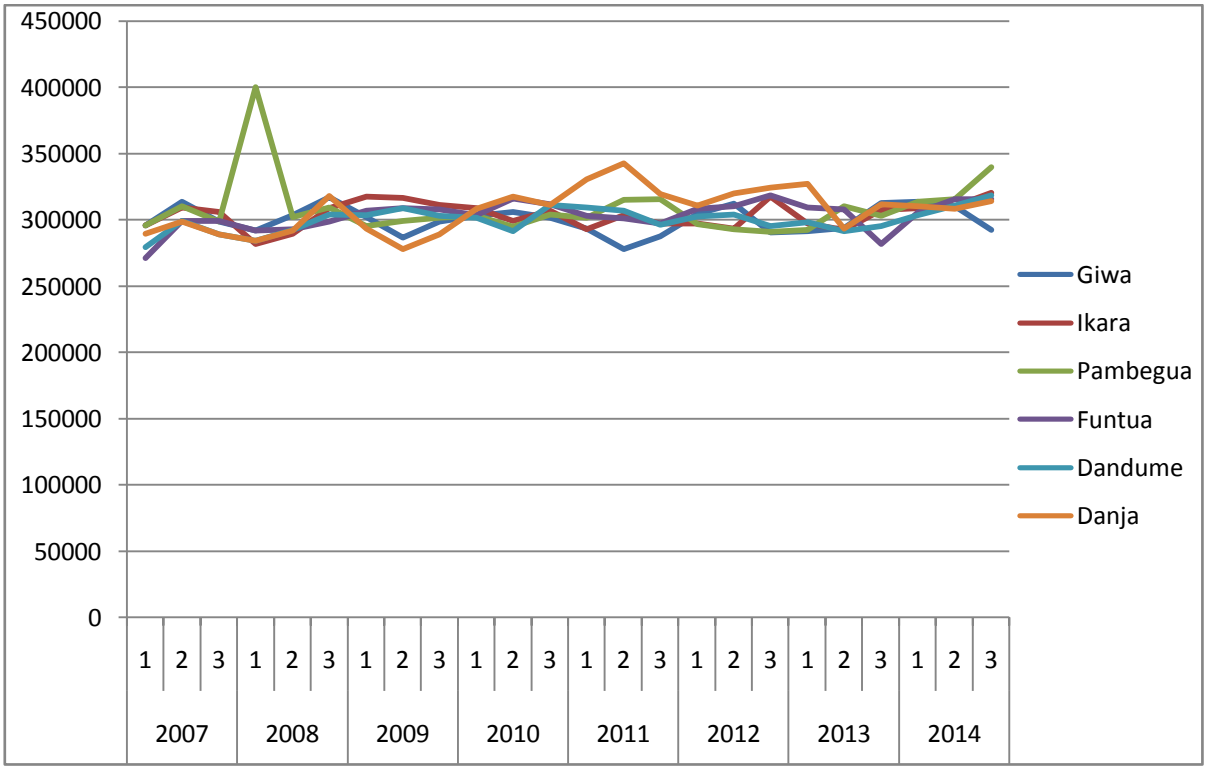


Figure 5: Price Trend for Mill Rice across the Six Supplying Markets

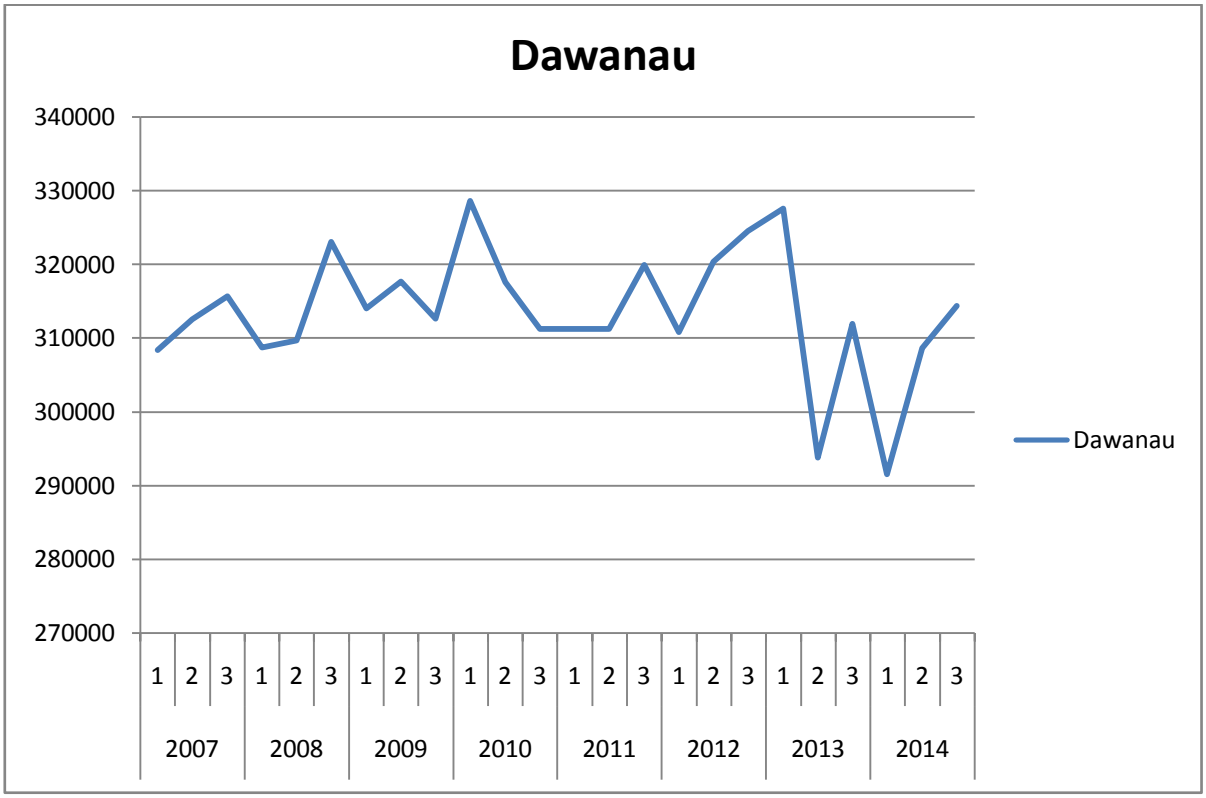


Figure 6: Price Trend for Mill Rice across the Reference or Urban Market

4.3.3 Trend analysis in the price of cowpea in the study area

The price of cowpea across the markets under study is variable as observed in Figure 5. This can be attributed to the fact that the crop has so many uses. The price is highest during the off-season and lowest during the harvest period in most cases. Also, the period of festivity makes the price of cowpea to be very high. The price of cowpea is lowest in those markets that are closer to the production side of the crop. The post - election violence of 2011 sharply increased the price of cowpea in the area under study as can be seen by the rise in price from ₦10,000 to ₦20,000 per ton in April.

The price of the crop as can be observed in the figure is always high especially during fasting period as a result of the excessive demand by consumer in the study area. This is the period when marketers make high profit. This can be attributed to Ramadan period of Muslims that dominate the study area. Previous findings by Simister and Chanda (2009), Okunnneye (2003) and Nuhu *et al.,* (2009), carried out in Northern Nigeria had documented an alarming increase and instability in staple food prices in Northern Nigeria. They documented that such prices variations among markets in Nigeria is necessary for the existence of a market, as it create incentives that attract market actors to engage in trade. In their opinion, excessive variability and no variability of staple food prices should rather be a point of concern.

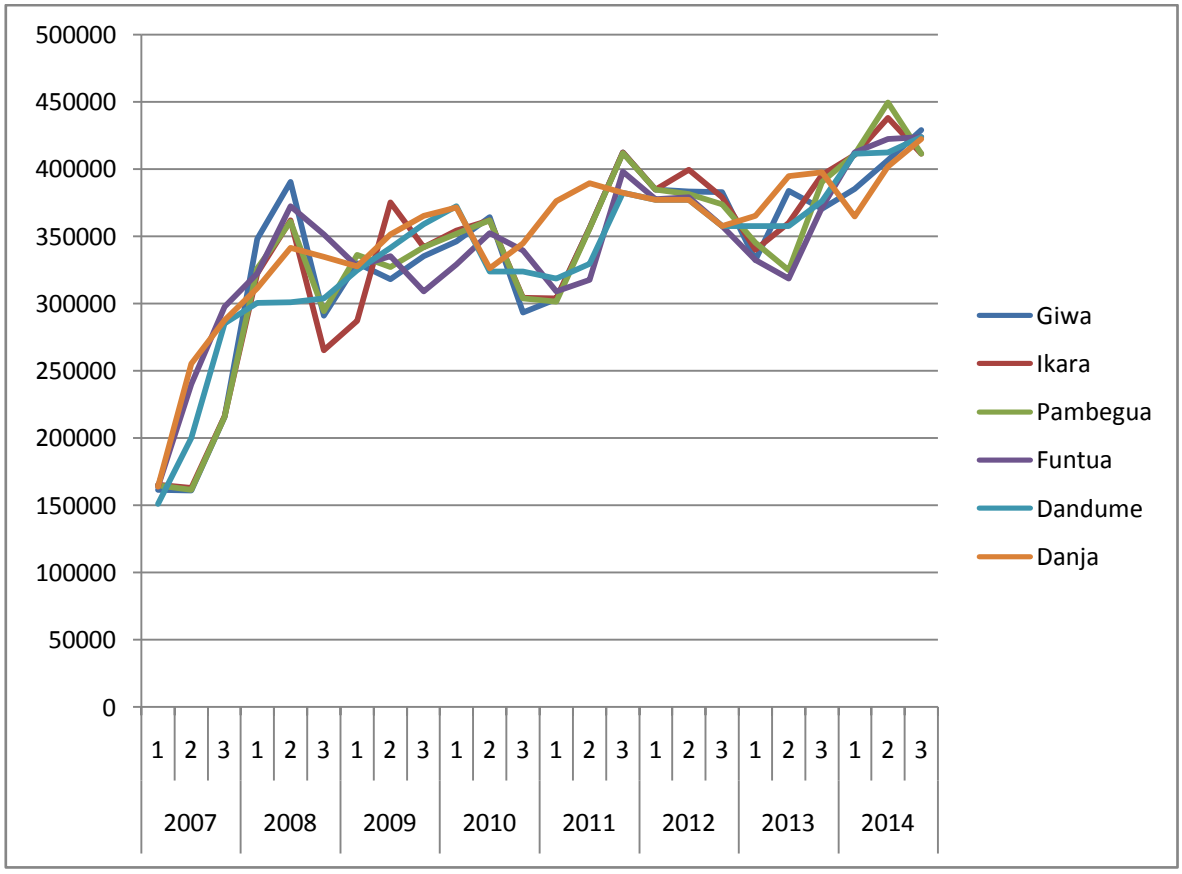


Figure 7: Price Trend for Cowpea across the Six Supplying Markets

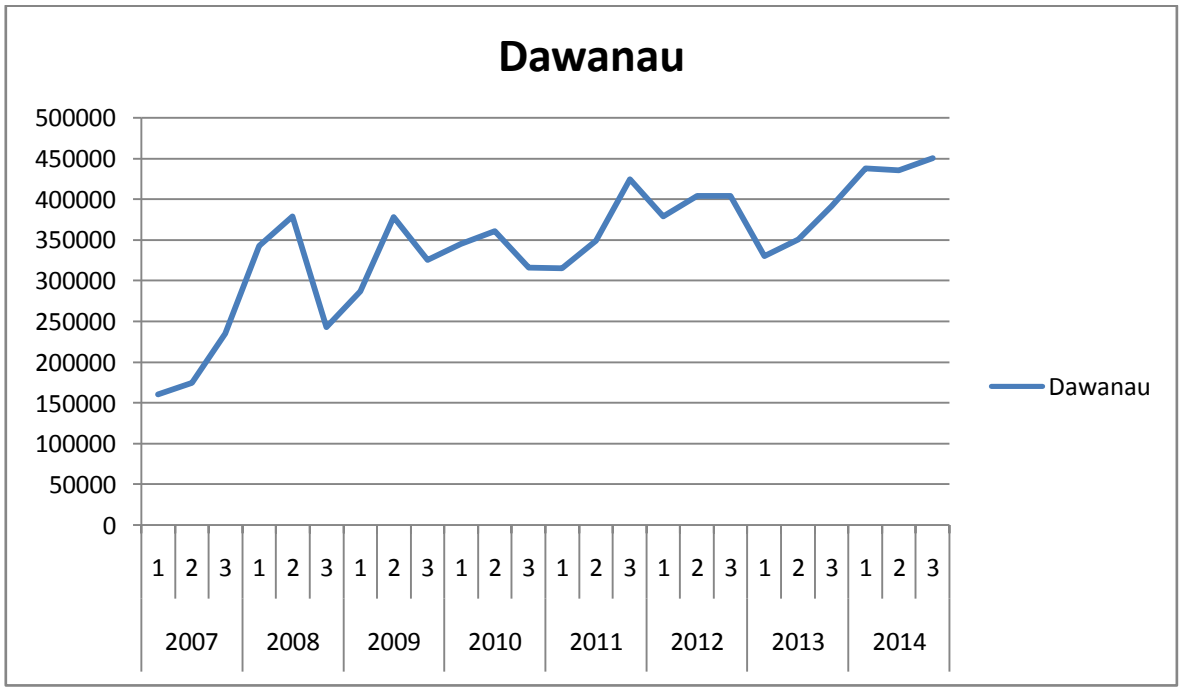


Figure 8: Price Trend for Cowpea across the Reference or Urban Market

4.3.4 Trend analysis in the price of Soyabean in the study area

The variation in the price series of soyabeans as can be seen in Figure 6 shows that the price of the commodity varies over a period of time across the markets under study. There is the period of relative low price and period of high price. The price of soyabean is always highest in the urban markets of the region while it is lowest in the rural markets. The reason for the high price in the urban market was the high demand of the crop while that of the rural markets was its high surplus. The maximum and minimum values obtained across the selected markets in the study area were ₦45,600 and ₦15,605 respectively.

The highest average was ₦97,720 recorded in Dawanau and Dandume markets respectively across the selected markets. Following this nature of fluctuations in the price of soyabeans in the rural and urban markets; it implies that, there is a strong evidence of symmetric price transmission mechanism or market integration between the two prices. Akpan *et al.,* (2009), has reported similar behaviour in their study of rural and urban prices of food grains in southern Nigeria.

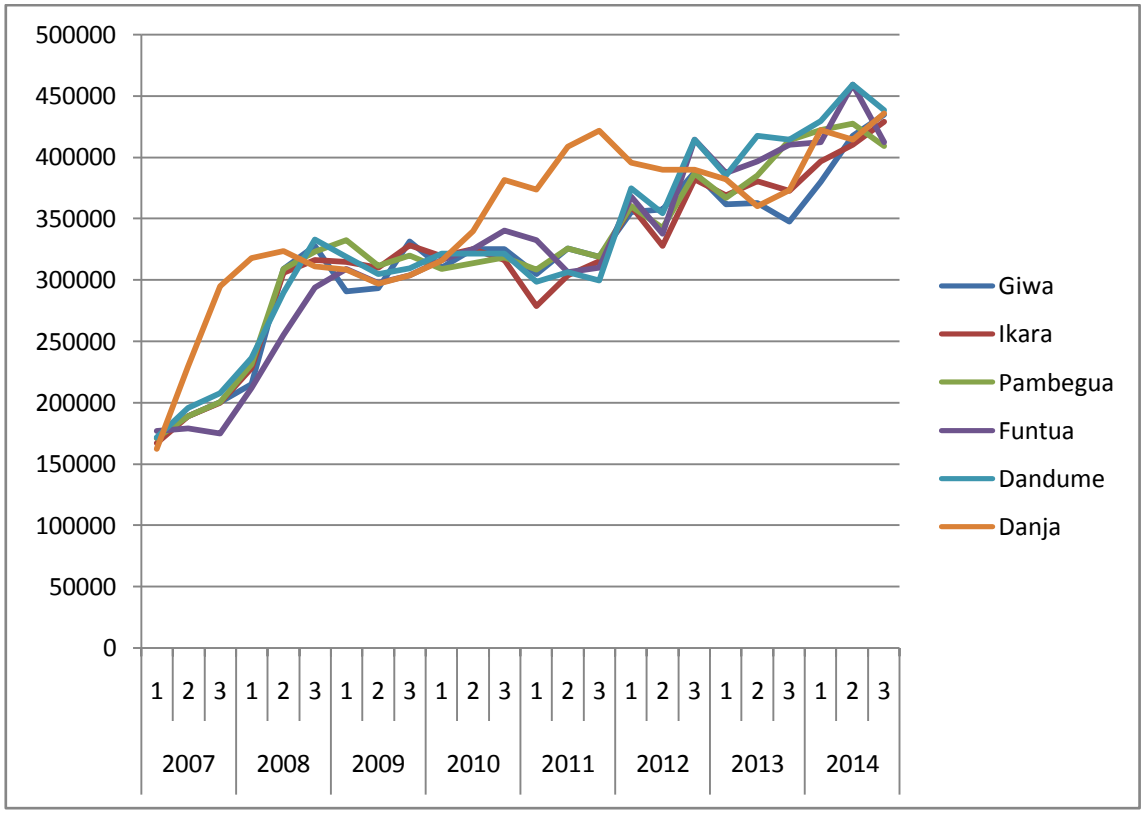


Figure 9: Price Trend for Soyabean across the Six Supplying Markets

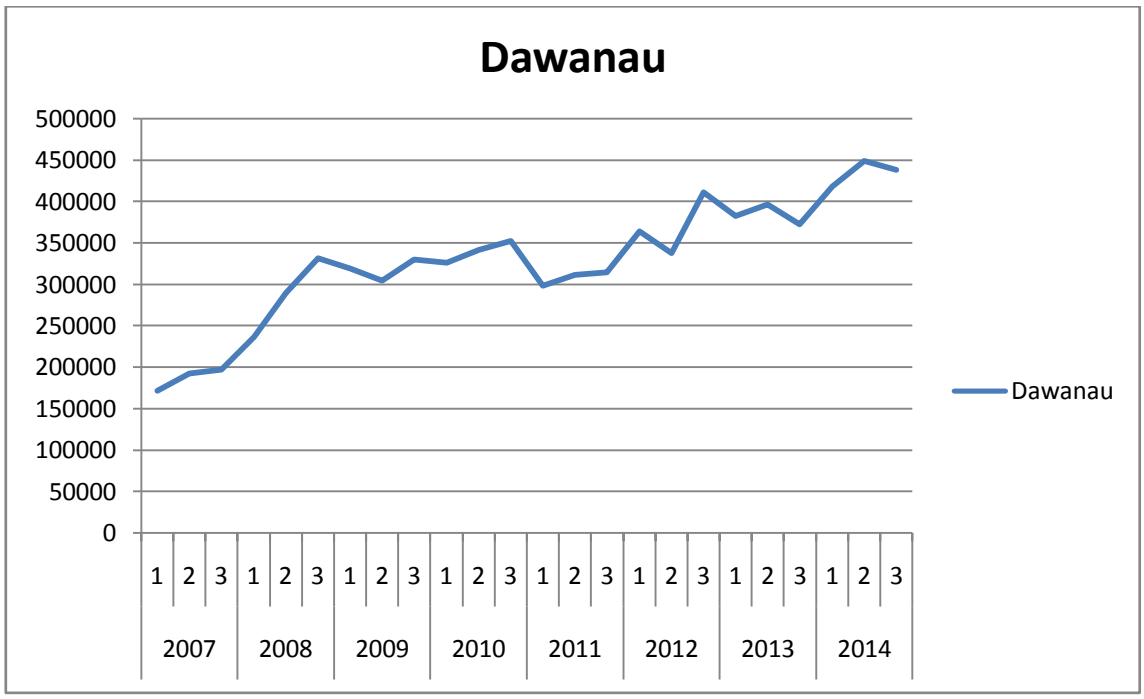


Figure 10: Price Trend for Soyabean across the Reference or Urban Market

4.4 Analysis of Inter Market Price Differentials in Relation to Transport and Other Transaction Costs

4.4.1 Analysis of inter market price differentials for maize

The result of the spatial price analysis for maize across the seven selected markets is presented in Table 10. The study showed that in 468 out of 564 the computed price spread was positive. The price spreads for maize, considering the six markets, ranged from a low price of – ₦4,690 (39th month) to a high price of ₦ 9,850 (40th– 42nd months) in Giwa market, – ₦6,450 (26th months) to (₦9,850, 94th months) in Ikara market, –₦5,350 (25th month) to ₦9,650 (15th, 20th and 35th months respectively) in Pambegua market, – ₦7,550 (87th month) to ₦9,950(0th and 34th months) in Funtua market, – ₦5,400 (86th month) to ₦9,980 (49th months) in Dandume market and – ₦6,400 (87th month) to ₦9,950 (7th month) in Danja market respectively.

The average of the positive price spreads considered separately ranged from a high price of ₦6,846 to a low price of ₦2,647 in Giwa and Danja markets respectively. These tend to indicate that on the average inter-market price differential closely related to transfer cost. But, these positive price spreads imply imperfections in the market and a departure from competitive conditions. This according to economic theory provides a potential opportunity for middlemen to realize excessive profits. Hays and McCoy (1977) noted however, that positive price spreads may not only result from exploitative practices of traders but are likely to be as a result of the nature of production and defects in the marketing system.

However, when taking the average of the positive and the negative spreads, only in Danja were the price spread consistently negative for eight years (as specified in table 10, out of 96 instances 31 were negatives) otherwise the price spread fluctuates between positive and negative for all the markets and crops studied. The predominance of negative price spreads indicates the complexity of conducting profitable trades between Dawanau and supplying markets, especially when there is a dearth of public information on prices in those markets. However, inadequate price information could have greatly increased risks associated with inter-market trade, as pointed out by Hays and McCoy, (1977); Roche and McQuinn, (2003).

Except for Danja, price spreads for maize was positive most of the time. Spreads that were negative lasted only a short time, but in 2009 and 2014, most of the price spreads for Danja and Dandume markets was negative. Giwa seems to have had more positive price spreads across the eight years studied, followed by Funtua, Pambegua, Ikara, Dandume and Danja markets respectively.

Table 10: Price Spread (₦/ ton) between each of the supplying market and Dawanau for maize

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	M	M	M	M	M	M
2007	1	5200	5450	5650	-50	2000	2050
	2	7700	7950	8150	450	500	550
	3	4750	5000	5200	1000	1050	1100
	4	1200	1450	1650	250	300	350
	5	1200	1450	1650	1950	5000	5050
	6	5200	5450	5650	3950	9000	9050
	7	3200	3445	-350	1950	9500	9550
	8	-4690	-4440	-4240	1060	6110	6160
	9	-3470	-3220	-3020	2280	3050	3100
	10	3995	4245	4445	1745	6795	6845
	11	-696	-446	-246	-946	7604	7654
	12	1050	1300	1500	2800	9150	7900
2008	13	3200	8450	5650	5950	6000	9050
	14	5200	5450	6650	6950	9000	7050
	15	9200	9450	9650	5050	8000	8050
	16	9200	9550	7650	8050	8000	5950
	17	4200	6550	4650	5050	7000	7090
	18	9200	9550	7650	8050	7500	7590
	19	9200	4550	6650	2600	3000	3090
	20	7200	9550	9650	-5400	-5000	90
	21	5200	5550	5650	750	1000	1090
	22	6200	6550	6650	750	1000	1090
	23	6200	-2450	-2350	3250	3600	3590
	24	8200	-3450	-3350	3250	3600	3590
2009	25	4350	-3950	-5350	-250	100	90
	26	8350	-6450	1650	-1300	-950	-960
	27	9350	4550	4650	4950	-2400	-2410
	28	9550	-450	4650	4950	-2900	-3410
	29	9550	-2450	-2350	4950	-4400	-4410
	30	9550	-5400	4650	9950	-1000	-1010
	31	9550	-5400	4650	4950	-4950	-4950
	32	7550	1100	1650	4950	-3400	-3400
	33	4550	-1400	1150	4950	-3400	-5400
	34	9550	-400	4650	9950	-400	-400
	35	9550	1600	9650	7950	-270	-270
	36	7550	-400	7650	450	100	100

Table 10: Price Spread (₦/ ton) between each of the supplying market and Dawanau for maize (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	M	M	M	M	M	M
2010	37	9350	3100	3150	1950	1600	1600
	38	8850	8600	3650	3450	3100	3100
	39	9850	4600	6200	3250	2900	2900
	40	9850	9500	4200	3350	-1140	-1390
	41	9850	9500	9300	5350	9850	-400
	42	9850	9500	9300	5350	9850	-2400
	43	8550	2600	7300	8350	7850	-400
	44	9650	4600	4300	9850	4850	4100
	45	9650	-400	4300	7850	6850	1100
	46	7150	6600	9300	9850	9850	9350
	47	9650	5600	5300	4850	7320	6620
	48	7650	5600	5300	4850	9550	8850
2011	49	9150	7100	2800	9350	9980	9280
	50	7650	-3400	-1200	9280	9480	8780
	51	9650	-400	-700	8350	8550	7850
	52	7450	2600	2300	8950	9150	8450
	53	9450	4600	4300	9850	8050	9350
	54	7450	4600	4300	4850	5050	4350
	55	6450	2600	2300	7850	7550	6850
	56	8950	1600	1300	8850	8550	5850
	57	7450	-400	-700	6850	6550	-1150
	58	8950	3100	2800	8350	6550	-4100
	59	1310	-3540	-3840	1710	6410	-4290
	60	4730	-120	-420	5130	-4070	-4770
2012	61	8550	6500	4300	7850	50	-650
	62	9050	3350	3300	7900	2050	1350
	63	9050	6350	6400	9900	6350	5650
	64	7050	9350	9400	4900	9050	8350
	65	8050	8350	8400	7900	8050	7400
	66	9050	5350	5400	9400	5550	4900
	67	4050	3350	3400	2450	2050	1400
	68	9050	350	400	-50	-2950	-3600
	69	4050	350	400	1950	-450	-1100
	70	5050	5350	5400	6950	1550	-4100
	71	8050	8350	8400	2950	550	-100
	72	9050	9350	7400	5450	5100	4400

Table 10: Price Spread (₦/ton) between each of the supplying market and Dawanau for maize (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	M	M	M	M	M	M
2013	73	9050	9350	9400	6950	6600	5900
	74	8200	8400	8400	7950	7600	6400
	75	9200	6600	6650	7450	7100	5900
	76	8700	4900	4950	8950	8600	7400
	77	5700	-100	-50	4450	4100	2900
	78	6700	2900	2950	7950	7600	6400
	79	9700	900	-50	6450	6100	5000
	80	3700	-300	-1050	5450	6100	5000
	81	8700	4700	3950	8950	4600	8600
	82	8700	4700	3950	8950	6600	8600
	83	7200	3200	2450	7450	2100	-1900
	84	1700	2700	1950	6950	1600	-3400
2014	85	3700	1350	8450	-4550	-4900	-4900
	86	7100	7350	6450	-5050	-5400	-5400
	87	4200	4350	3450	-7550	-4400	-6400
	88	9200	9350	8450	-4050	-4400	-1400
	89	9200	9350	8450	-1550	-1900	-1900
	90	2200	6350	5450	-4250	-4600	-1400
	91	4200	4350	3450	-2050	-2400	-2400
	92	7200	9350	8450	4450	4100	4100
	93	9200	9350	6450	7950	7600	7600
	94	9700	9850	8950	6950	6600	6600
	95	5200	5450	4550	5950	5600	5600
	96	4200	6350	5450	3950	3600	3600

Note : M=maize, GW= Giwa, IKR=Ikara, PG= Pambegua, FTU=Funtua, DD=Dandume and DJA= Danja

4.4.2 Analysis of inter market price differentials for mill rice

Table 11 shows the value of price spread for mill rice across the six markets studied over a period of eight years. The highest positive spread was ₦14,480 (at 32nd month) and the lowest negative spreads was – ₦9920 (at 50th month) both recorded in Danja market. The total positive price spreads across the markets was 458 out of the 564 instances. The combine positive and negative price spreads for rice ranged from – ₦9,070 (85th month) to ₦13,700 (92nd month), – ₦6,460 (26th month) to ₦14,350 (96th month) – ₦8,320 (85th month) to ₦14,200 (14th month), – ₦9,920, (50th month) to ₦14,480 (32nd month) in Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets respectively. The average value of the positive spreads ranged from lowest of ₦2,923 in Funtua market to highest of ₦4,673 in Dandume market.

These positive price spreads across the markets implies an inefficiency and imperfection in marketing system and a departure from competitive condition. For example, the highest average positive price spreads for mill rice between Dandume market (₦4,673) and Dawanau market was almost closed to the measured transfer cost between those two markets and half of the maximum price spreads (₦11,000 i.e., 11th month) recorded in the study. This indicated a steady rise in wholesale prices of mill rice in all the markets; this is because throughout the study the highest average positive price spreads values were lower to the maximum price spreads values recorded in all the markets. Akpan *et al.,* (2009), also observed similar behaviour when they studied marketing and price transmission of local and foreign rice commodities in Nigeria.

In addition, the result suggests that mill rice wholesale prices generally increased across the six markets and was worse for Giwa market (as specified from 77th months to 91th months in Table 11), probably due to incessant cases of insecurity, civil unrest and political instability that ravaged most parts of the northern parts of the country from 2013 to date. Adekunle (2012), also observed similar behaviour when he studied agricultural price policy, consumer demand and implications for household food security in Nigeria.

Table 11: Price spread (₦/ ton) between each of the supplying market and Dawanau for rice

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	R	R	R	R	R	R
2007	1	6200	6450	6650	9950	10000	5050
	2	6800	7050	7250	8450	10600	5650
	3	-2800	-2550	-2350	6450	7000	6550
	4	-800	-1550	-350	5450	6000	5550
	5	-800	-1050	-350	4450	4500	4550
	6	-1800	-1550	-1350	2950	3000	3050
	7	-800	2950	2650	4950	5000	5050
	8	-1300	4450	1650	3950	4000	4050
	9	200	0	650	4950	5000	5050
	10	2200	2450	8150	6450	8500	8550
	11	9700	2950	5150	3450	11000	11050
	12	8200	8950	8150	6450	8500	8550
2008	13	3995	8745	9445	2745	10295	10345
	14	4250	8500	14200	7100	7150	7200
	15	4900	6650	6350	5750	5700	5750
	16	3700	4050	4150	5000	4950	5000
	17	3100	3450	3550	3450	3400	3490
	18	-300	5050	150	5050	5000	5090
	19	-300	8000	650	5600	6500	6590
	20	3200	8550	8150	8600	9000	10590
	21	4200	9550	6650	9750	10000	2090
	22	-800	4550	4150	9750	5000	5090
	23	-1300	-2450	1150	2750	3100	-1910
	24	4700	4550	2050	4750	4400	90
2009	25	-650	-450	6650	-250	5100	5090
	26	1340	-6460	1640	740	-910	4080
	27	6350	1550	7650	4950	5100	10090
	28	11050	1550	7650	2950	5100	4590
	29	7550	-1450	4150	1450	1100	11590
	30	7750	-2200	3350	650	300	10290
	31	11550	2100	7650	4950	4600	12810
	32	11430	3980	9530	6830	6480	14480
	33	1430	-6020	-470	-3170	-3520	3480
	34	9550	4600	6650	4950	4600	11600
	35	-290	-240	1810	1110	4760	4760
	36	5900	6950	8000	7300	9450	9450

Table 11: Price spread (₦/ ton) between each of the supplying market and Dawanau for rice (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	R	R	R	R	R	R
2010	37	4850	9600	10650	9950	9600	11100
	38	9350	4600	5650	4950	8100	8100
	39	8550	3300	6400	8100	6300	900
	40	9350	4000	7200	7350	5850	100
	41	5250	3900	6700	4250	9700	200
	42	2350	2000	6800	350	7800	2100
	43	2550	9100	5800	-1150	6350	3100
	44	2850	6300	5500	-3450	6550	2400
	45	3150	2100	6300	-1150	1850	1600
	46	-350	1100	-700	-650	-650	4350
	47	3400	-1650	-950	-900	-1900	4100
	48	9650	6100	1300	6850	2050	-650
2011	49	-1350	-1400	-1700	-7050	-6350	6880
	50	2150	4600	4300	1350	50	-9920
	51	10950	9600	1410	9850	4550	-7920
	52	9450	7600	4300	9850	10050	-2320
	53	9450	4600	4300	7350	6550	-7320
	54	4900	-400	-8200	-150	-4450	-5650
	55	13450	-400	-3700	-150	-850	-6150
	56	9450	9600	6300	9850	10050	-1150
	57	13550	4600	1542	4350	6050	3850
	58	8450	8100	-700	8850	8050	5350
	59	6950	7100	1300	7350	7050	6350
	60	4950	5100	300	5350	3550	8350
2012	61	4050	4450	600	-150	2050	9350
	62	-1750	550	2000	100	250	10150
	63	1600	4900	6950	1650	2600	6300
	64	1550	7350	9400	900	7050	-1150
	65	1500	9350	9400	4400	9550	-1100
	66	1450	7350	7400	3400	3050	900
	67	1150	7150	7200	1750	1850	1100
	68	3050	2350	6400	400	1050	900
	69	8550	3850	9000	1450	6550	-600
	70	9050	-650	10700	-50	9550	-1100
	71	10500	1350	9400	3450	9550	3900
	72	10450	1350	10400	4250	9100	3900

Table 11: Price spread (₦/ton) between each of the supplying market and Dawanau for rice (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	R	R	R	R	R	R
2013	73	11950	4850	9900	5450	9100	3400
	74	9750	9950	9950	5500	8650	2850
	75	10700	10900	10950	6450	9100	1900
	76	3700	9400	9450	3450	5100	3400
	77	-1300	-600	-5550	-6550	-400	13400
	78	-1300	-600	-5550	-5350	-400	13400
	79	-1300	-600	-7550	-3550	600	13500
	80	-1800	4200	-3550	3950	4600	8500
	81	2200	2700	2450	10450	8100	5100
	82	-2400	-400	-650	6350	5000	8200
	83	-3300	-800	3450	8250	600	8600
	84	-5800	1200	-4550	6450	600	11600
2014	85	-9070	-4650	-8320	2250	-400	5600
	86	-7900	3850	1450	-9050	2900	-1400
	87	-6800	3850	2450	-8550	3600	8600
	88	-5800	3850	3450	-9050	2900	8600
	89	-1200	8850	8050	-4750	3600	3600
	90	-2700	8850	6550	-3550	-1400	600
	91	-3800	13850	10450	-1750	1600	1600
	92	13700	8850	3450	-1550	1600	2100
	93	6700	13850	8450	1450	2900	1100
	94	6200	9350	3450	-1550	600	1600
	95	5200	9350	1450	-3550	3600	7600
	96	4700	14350	3450	-4050	8600	13100

Note : R= rice, GW= Giwa, IKR=Ikara, PG= Pambegua, FTU=Funtua, DD=Dandume and DJA= Danja

4.4.3 Analysis of inter market price differentials for cowpea

The results of the spatial price relationship or the ability of the marketing system to allocate grain over space from the selected supplying markets to Dawanau market for cowpea was presented in Table 12. The value of positive price spreads for cowpea across the market studied was lowest in Pambegua and Funtua markets (₦13,950) and the highest for market in Dandume (₦17,350). The study also revealed that both the negative and the positive values of price spreads from the lowest to highest value ranged from −₦16,740 (28^{th} and 37^{th} months) to ₦16,670 (30^{th} and 37^{th} months) −₦16,990 (37^{th} month) to ₦16,350 (85^{th} and 87^{th} months), −₦16,940 (37^{th} month) to ₦13,950 (96^{th} month), – ₦8,150 (48^{th} month) to ₦13,950 (82^{th} month), – ₦16,000, (11^{th} month) to ₦17,350 (59^{th} month) and −₦16,600 (72^{th} and 78^{th} months) to ₦16,650 (59^{th} month) in Giwa, Ikara, Pambegua, Funtua, Dandume and Danja markets respectively. The least price spread all through the investigated markets was recorded in Funtua market −₦8150 (48^{th} month).

The average positive spreads stood from the lowest value of (−₦77.30) in Giwa market to the highest value of (₦4342) in Funtua market. These results strongly suggest that the excess prices differences between the Dawanau market and other supplying markets did not result from planned manipulation under oligopolistic conditions. It is rather a result of imperfection inherent in the system which is due to certain characteristics of ineffective information and lack of specialization in production of the crop which leads to lack of concentration in supply.

This inefficiency may be attributed to several factors including some degree of market domination by traders, lack of adequate market information, institutional barriers to the smooth flow of cowpea between markets, traditional buying and selling practices that condition traders to buy and sell cowpea only in specific markets and period regardless of prevailing prices, high market risk in moving grain, etc. This is in line with the work of Nuhu *et al.,* (2009), in their studies of food grain marketing in North East Nigeria: a study of spatial and temporal price efficiency,

Table 12: Price spread (₦/ ton) between each of the supplying market and Dawanau for cowpea

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	CP	CP	CP	CP	CP	CP
2007	1	-2800	3660	-2350	-50	0	50
	2	700	2950	1150	-550	4500	-450
	3	-4300	-7050	-3850	-1550	3500	-1450
	4	-3800	-10550	-3350	-6050	4000	-5950
	5	-6800	-8550	-6350	9950	0	-4950
	6	1200	1450	1650	-50	0	50
	7	14200	9450	9650	9950	0	50
	8	200	4450	-5350	9950	-5000	50
	9	7000	7250	7450	9950	0	50
	10	4200	4450	4650	4950	-5000	-4950
	11	3200	3450	3650	9950	-16000	50
	12	7200	7450	7650	9950	11000	10050
2008	13	4200	-550	-350	9950	13000	10050
	14	4200	4450	4650	4950	15000	10050
	15	9200	-10550	9650	5050	10000	10050
	16	-800	-2450	4650	50	15000	5050
	17	4200	-13450	4650	5050	15000	5090
	18	3700	-450	9650	5050	15000	90
	19	4200	-450	-350	-5400	9000	-4910
	20	9200	4550	9650	4600	15000	10090
	21	700	0	9650	4750	5000	-9910
	22	-11800	-450	-350	4750	10000	90
	23	-12000	2550	4650	9750	15100	10090
	24	-5800	3050	150	4750	4100	90
2009	25	-650	-450	-350	9750	100	90
	26	410	9550	9650	9750	-13840	90
	27	2400	9550	4650	9950	-6850	5090
	28	-16740	-450	4650	4950	11810	1300
	29	-10450	-450	4650	-50	-400	-410
	30	16670	1600	9650	-50	4600	9590
	31	-1450	4600	-350	4950	14600	14600
	32	-13310	5100	-350	7090	1740	1740
	33	-2340	4600	650	6160	-11290	-11290
	34	300	350	400	4450	-4650	-4650
	35	-13750	-5400	-8350	650	-400	-10400
	36	-10410	-10360	-10310	-5010	4600	-15400

Table 12: Price spread (₦/ ton) between each of the supplying market and Dawanau for cowpea (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	CP	CP	CP	CP	CP	CP
2010	37	-16740	-16990	-16940	4950	-5400	-5400
	38	5850	5600	5650	9950	-5400	-5400
	39	290	0	140	4950	2040	2040
	40	4850	4500	4700	5350	9850	14600
	41	5400	5050	4850	5350	9850	9600
	42	1850	1500	1300	350	950	700
	43	-12450	-12400	-12700	350	-150	-400
	44	10140	1390	9790	-150	4850	-5900
	45	2200	3590	1850	4850	-6600	-7350
	46	-850	6350	-1200	9850	-150	-650
	47	9150	9100	8800	-150	50	4350
	48	1650	1600	1300	-8150	-7950	-650
2011	49	9650	9850	11300	4850	2050	4350
	50	9350	9300	9000	2550	-250	6850
	51	-5290	-5340	-5640	-2090	-4890	5350
	52	-14570	-14420	-14720	830	-1970	5350
	53	-5210	-5060	-5360	8190	3390	4350
	54	6450	6600	6300	4850	50	9350
	55	-9220	-9070	-9370	1180	880	8850
	56	-5550	-5400	-5700	4850	-4450	-5150
	57	-5550	-5400	-5700	5850	5550	4850
	58	5450	5600	5300	8850	15050	14350
	59	7950	8100	7800	8350	17350	16650
	60	7450	7600	7300	8860	8560	7860
2012	61	550	950	300	4350	4050	3350
	62	-450	-650	-700	2900	2550	1850
	63	-7950	-7650	-7600	-6100	-6450	-7150
	64	-950	-650	-600	-600	-950	-1650
	65	6050	6350	6400	4500	4150	3500
	66	8050	8350	8400	9900	11550	10900
	67	-10950	4350	4400	8950	8550	7900
	68	-5950	-650	4400	5450	5050	4400
	69	-950	-5650	-600	4950	4550	3900
	70	-5950	-5650	-5600	-50	-450	-1100
	71	-950	-650	4400	9950	9550	8900
	72	-10950	-5650	-10600	-5050	-5400	-6100

Table 12: Price spread (₦/ ton) between each of the supplying market and Dawanau for cowpea (Ct'd)

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	SB	SB	SB	SB	SB	SB
2013	73	-5950	-650	-600	-5050	-5400	-6100
	74	-5800	-600	-10600	-50	-400	-3600
	75	-800	-600	-6050	1950	4600	1400
	76	-1300	-10600	-550	1950	4600	-11600
	77	-1300	-10600	4450	6950	4600	-16600
	78	-2300	-11600	8450	10950	4600	-16600
	79	-7300	-11600	7450	10950	4600	-11500
	80	-11300	-5800	8450	10950	-400	-11500
	81	-6300	9200	-1550	3950	9600	-1400
	82	-6300	4200	3450	13950	4600	-11400
	83	3700	4200	3450	-1050	-1400	-1400
	84	1700	2200	1450	-1050	-1400	13600
2014	85	12700	16350	12450	5950	5600	8600
	86	9100	14350	8450	8950	8600	3600
	87	1200	16350	450	5950	5600	8600
	88	4200	14350	950	3950	8600	3600
	89	-800	9350	-2150	3950	8600	8600
	90	-5800	4350	-7550	-1050	3600	3600
	91	-800	9350	3450	3950	3600	8100
	92	7200	14350	6450	8950	9600	12900
	93	6200	9350	5450	8950	8600	9900
	94	13800	9350	8050	8950	8600	8600
	95	12200	-650	11450	3950	3600	3600
	96	14700	4350	13950	3950	3600	3600

Note : CP= Cowpea, GW= Giwa, IKR=Ikara, PG= Pambegua, FTU=Funtua, DD=Dandume and DJA= Danja

4.4.4 Analysis of inter market price differentials for soyabean

The result in Table 13 shows the range of positive and negative price spread across the investigated markets from – ₦16,800 (21st month) to ₦19,700 (13th month) in Giwa market, – ₦8,700 (18th month) to ₦11,850 (91st month) in Ikara market, – ₦15,550 (76th month) to ₦12,650 (95th months) in Pambegua market, – ₦7,050 (88th month) to ₦16,500(94th month) in Funtua market, – ₦10,400, (79thmonth) to ₦14,550 (57th month) in Dandume market, and – ₦11,400 (45th month) to ₦16,150 (34th month) in Danja market. Danja market has the highest positive average value of (₦3,235) while Dandume market takes the lowest average of (₦1248). The overall average of all the six rural markets investigated was (₦11934).

Soyabean had considerably more price spreads that were negative (in 205 out of 564 instances). Only at Danja market were the exceptions occurred, in which price spreads had more positive value (in 71 out of 96) over most part of the eight years studied. However, when taking the negative spreads across the investigated markets, only in Giwa and Dandume markets (in 36 cases) the price spreads consistently more negative for the eight years for soyabean; otherwise the price fluctuates between positive and negative for all the markets. This implies that lack of information on the local uses of soyabean in commercial quantity by members of the community. The local consumption of soyabean was not much compared to maize and cowpea. That is why there were more negative prices recorded, especially in Giwa and Dandume markets, over the period of study.

In addition the result in Table 13 revealed that in 19 cases out of 96 the computed price spreads is zero; that is the computed price spreads equal to transfer cost. This implies efficiency in the marketing system in some markets even though it did not last long. This is in line with the work of Nuhu *et al.,* (2009), in their studies of food grain marketing in North East Nigeria: a study of spatial and temporal price efficiency,

Table 13: Price Spread (₦/ ton) between each of the supplying market and Dawanau for soyabean

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	SB	SB	SB	SB	SB	SB
2007	1	700	2950	1150	-50	0	3550
	2	-3300	-1050	-2850	-5550	0	-450
	3	1045	1295	1495	295	0	4895
	4	-1800	-1550	-1350	-50	0	5050
	5	-300	-50	150	7950	0	-4450
	6	1200	1450	1650	4250	0	7050
	7	1390	1640	1840	1640	5000	5050
	8	-5675	-5425	-5225	-625	7000	5050
	9	-3295	-3045	-2845	455	8000	5050
	10	-3800	-3550	-3350	6950	8000	8050
	11	1200	1450	1650	11950	0	3050
	12	1750	2000	2200	12000	0	-1950
2008	13	19700	6950	4150	12450	0	50
	14	3200	3450	3650	10450	0	50
	15	-4210	-3960	-3760	140	0	1050
	16	200	0	650	7050	0	-1950
	17	-6300	-5950	-5850	7550	0	90
	18	-9050	-8700	-8600	9300	0	40
	19	-5800	-2450	-5350	14600	0	-3910
	20	-2800	-950	-2350	12100	0	-360
	21	-16800	1550	-350	10250	0	3590
	22	11700	2050	2150	10250	0	5090
	23	4200	9050	4650	9150	100	9490
	24	9200	6550	4650	10250	-4900	10590
2009	25	9350	-450	-5350	5250	100	5590
	26	7350	2550	-5350	1200	100	1540
	27	6850	1550	6650	2605	100	2745
	28	9550	-3450	6650	1750	100	1390
	29	7050	1550	-1350	4850	-400	4490
	30	4100	-850	-800	3450	-400	3090
	31	-1450	-400	2650	-2550	-400	-2900
	32	700	7750	800	6100	-400	5750
	33	-450	1600	4650	7450	3450	7100
	34	9550	4600	9650	16500	13450	16150
	35	-10450	9600	9650	950	2190	600
	36	-6550	9600	9650	3850	-400	3500

Table 13: Price Spread (₦/ ton) between each of the supplying market and Dawanau for soyabean

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	SB	SB	SB	SB	SB	SB
2010	37	-5150	-3400	-350	-550	-4300	-900
	38	9850	1100	4650	3950	700	3600
	39	9850	6600	9700	5450	5700	5100
	40	4850	6500	9700	5350	5950	4600
	41	9850	9500	9300	10350	10950	9600
	42	4850	4500	9300	5350	5950	-5400
	43	-450	-400	4300	350	950	-5400
	44	4650	4600	9300	4850	5950	4100
	45	4650	1600	1300	4850	5950	-11400
	46	9650	9600	6300	-150	10950	-8150
	47	9650	11600	11300	4850	11150	-10650
	48	9650	9600	11300	9350	11150	-5650
2011	49	-2760	4190	-6110	9850	50	-5650
	50	-5350	9600	-8700	9850	50	4350
	51	1310	3260	2960	4850	50	4350
	52	-1880	6270	-2030	-150	50	9350
	53	-6550	-400	-6700	4850	5050	9350
	54	-550	4600	-700	-150	50	4350
	55	-6890	2760	-7040	-150	-450	3850
	56	-7670	-2020	-7820	-150	-450	3850
	57	-5550	-1900	-5700	4850	14550	12850
	58	-3550	-3400	-3700	-150	-450	8850
	59	2450	2600	2300	-150	-450	8350
	60	3450	3600	3300	-150	-450	9350
2012	61	-450	-50	-700	-150	-450	8850
	62	-450	-650	-700	-5600	-5950	8350
	63	9050	4350	4400	900	550	3850
	64	-6440	-6140	-6090	-100	-450	8850
	65	-12850	-2550	-2500	-100	9550	8900
	66	-15950	4350	4400	-100	9550	8900
	67	6050	6350	-8600	-50	12550	-1100
	68	-950	-650	-600	-50	-450	8900
	69	50	350	400	-50	-450	3900
	70	9050	8850	9400	-2050	-2450	3900
	71	9050	4350	-600	-50	-450	8900
	72	9050	9350	9400	-4050	-4400	3900

Table 13: Price Spread (₦/ ton) between each of the supplying market and Dawanau for soyabean

		Markets					
		GW	IKR	PG	FTU	DD	DJA
Years	Months	SB	SB	SB	SB	SB	SB
2013	73	4050	9350	9400	-5050	-5400	-6100
	74	9200	4400	9400	-50	-400	-1100
	75	4200	-600	-1050	-50	-400	3400
	76	3700	-5600	-15550	-50	9600	-2100
	77	8700	4400	-550	450	-5400	3400
	78	8700	4400	4450	4950	-10400	2500
	79	8700	4400	3450	-5050	-5400	14000
	80	13700	4200	3450	-5550	-4900	8500
	81	8700	4200	3450	-5050	-4400	8600
	82	700	9200	3450	3950	600	3600
	83	8700	4200	3450	3950	-1400	-1900
	84	8700	9200	-3250	3950	-1400	-6400
2014	85	8700	4350	-1540	3950	-6400	3600
	86	14100	9350	-1550	6450	-1400	-6400
	87	9200	4350	-1550	-6750	-7100	-1400
	88	9200	4350	-1600	-7050	-7400	-400
	89	9200	9350	2950	-6050	-6400	5600
	90	9200	8850	-1550	-6650	-7000	5100
	91	9200	11850	8450	-1050	3600	7150
	92	4200	6350	5450	3950	8600	7800
	93	-800	-650	3450	8950	13600	6600
	94	-2300	2850	8450	7450	10100	8550
	95	3200	4150	12650	8950	3800	7840
	96	4200	4350	3450	8950	-1400	-1400

Note : S=Soyabeans, GW= Giwa, IKR=Ikara, PG= Pambegua, ,FTU=Funtua, DD=Dandume and DJA= Danja

4.5 Relationship between the storage cost and the seasonal price variation

4.5.1 Analysis of storage cost and seasonal price variation for maize

Table 14 shows the net seasonal rise in maize prices expressed as a percentage greater than (or less than) expected prices across the seven selected markets studied over a period of eight years (from 2007-2014). Maize is usually harvested in September to October and the seasonal price movement showed that high and low points are consisted with the harvest period. In Table 14 the average net increase in maize price at Danja market was about 60% and 58% at Dandume market respectively in 2010.The highest per-unit profits from buying at harvest would have been obtained by selling in January (₦84) and August (₦92) in 2010. However, in this study only in fourteen (14) of the fifty six (56) instances for the seven markets studied had the yearly average seasonal increase in maize prices exceed the calculated expected increase (Tables 14). This is an indication that traders might not have been making per unit profit in maize for almost all part of the eight years studied.

Therefore, it is not a rational decision for traders to stored maize all throughout the years speculating for an increase in price because the gross returned to storage is less than the costs of storage. This seems to suggest that in these markets, traders monthly purchases are about equal to monthly sales for maize. This is in line with the researched of Nuhu *et al.*, (2009), in their study on food grain marketing in Northeast Nigeria, found that traders did not make excess profit in maize particularly those that rented their shops for storage of their grains.

Table 14: Average net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for maize

MARKETS	YEARS							
	2007	2008	2009	2010	2011	2012	2013	2014
GIWA	8.08	-8.83	-1.33	5.75	-6.08	-5.67	-10.08	-4.25
IKARA	3.58	8.08	-1.92	-4.83	-3.42	-2.58	9.83	-10.33
PAMBEGUA	9.08	-12.08	-4.08	39.75	-4.25	-9.83	-2	-12.25
FUNTUA	-8.58	-0.17	-2.17	21.92	-4.83	23.33	-7.17	-6.83
DANDUME	-1.25	-2	-14.58	57.75	-9.58	-16.67	-17.42	-14.25
DANJA	-8.92	-9.25	-8.5	59.92	53.83	-16.25	-20.67	-9
DAWANAU	1.91	-1.25	-5.33	23.42	14.58	-7	-13.25	-24.08

4.5.2 Analysis of storage cost and seasonal price variation for mill rice

Table 15 showed that the average net increase in price of rice at Ikara market was (48%) 2007 and (41%) at Danja market 2011. Mill rice is usually harvested in August-September. The harvest per-unit profit from buying at harvest would have been obtained by selling in January (₦54) 2011 at Danja market and April (₦57) 2007 at Ikara market. This seasonal price increases vary considerably among markets and between months within a given year. Comparison of the expected and actual price of storage across the seven selected markets in the below Table, shows that in 54 cases out of 56 the computed net seasonal storage returned exceed the costs of storage throughout the study. This implies that the expected price rises is greater than the cost of storing rice and this is an indication that traders made more than normal gain and hence generate more profit. This is also an indication of inefficiency in the marketing systems. Adekanya (1982), supported this in his researched on marketing margins for food, who found that food grains are stored and resale when the price rises to generate excess profit.

Table 15: Average net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for mill rice

MARKETS	YEARS							
	2007	2008	2009	2010	2011	2012	2013	2014
GIWA	27.42	27.33	23.67	25.42	16.33	24.25	24.33	5.58
IKARA	48.08	36.08	12.67	35.083	20	20.58	17.67	12.25
PAMBEGUA	25.33	17.58	18.67	12	7.58	11.83	1.083	15.08
FUNTUA	21.83	20.25	18.92	30.75	23.5	31.08	17.083	24.08
DANDUME	21.67	19.92	18.67	26.58	28.17	11.92	12.42	16.08
DANJA	22	21.25	18.58	32.33	40.67	34.42	30.67	13.83
DAWANAU	10.47	11.25	8.5	5.33	5.17	2.17	-2.42	-1.75

4.5.3 Analysis of storage cost and seasonal price variation for cowpea

Relationship between the storage cost and the seasonal price variation for cowpea is presented in Table 16. It was observed in Table 16 that there are significant seasonal variations in the prices of cowpea across the selected markets investigated over a period of eight years. The gross returns to storage are highest (about 83%) in 2009, followed by 74% in 2008, both at Ikara market. Comparing these figures to the current cost of borrowing capital, 9% per annum, it seems that the returns to storage are high. The harvest per-unit profit from buying at harvest would have been obtained by selling in June (₦142) 2008 and July (₦121) 2008 both at Ikara market.

Comparison of the expected and actual price of storage across the seven selected markets in Table 16 shows that 54 out of 56 computed cases, net seasonal storage returned exceed the costs of storage throughout the study. This implies that the marketers are making abnormal profit in the storage of cowpea over the years and hence brings an imperfection and inefficiency in the marketing system. This is in line with the work of Nuhu *et al.,* (2009), in their work on food grain marketing in Northeast Nigeria, observed that there is abnormal profit made in the storage of cowpea.

Table 16: Average net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for cowpea

MARKETS	YEARS							
	2007	2008	2009	2010	2011	2012	2013	2014
GIWA	17.42	35.25	56.17	39.25	49.25	69.58	58.42	51.75
IKARA	7.83	74.83	83.92	61.75	75.75	62.42	68.08	16.42
PAMBEGUA	4.08	70.58	49	31.5	41.92	62.83	52	44.83
FUNTUA	40.33	42.42	48.08	39.17	59.92	53.33	-78.83	-79
DANDUME	14.33	12.42	6.25	6.25	7.33	5.92	0.92	4.42
DANJA	20.42	63.67	39.5	29	41	36.33	29.58	25.75
DAWANAU	7.83	49	25.17	14.33	21.42	25.42	18.25	14.58

4.5.4 Analysis of storage cost and seasonal price variation for soyabean

Table 17 shows that the net seasonal rise in price expresses as a percentage greater (or less) than expected price for soyabeans from 2007-2011. Soyabean is usually harvested in September to October. The average net increase in price of soyabeans at Dawanau market was (72%) in 2008 and (45%) at Funtua market in 2011. The harvest per-unit profit from buying at harvest would have been obtained by selling in August (₦115) 2011 at Dawanau market and February (₦45) 2007 at Ikara market.

Comparison of the expected and actual price of storage across the seven selected markets as shown in Table 17 shows that there are 47 out of 56 of the computed cases had net seasonal storage returns exceeded the costs of storage in the study. This implies that the traders made abnormal profit and hence encourage them to store the grain in large quantity. This is an indication of inefficiencies in the marketing system across the study area. This is also supported by Hays and McCoy (1977), in their researched on food grain marketing in Northern Nigeria, found that traders made abnormal profit by keeping their grains in shops until when prices rise.

Table 17: Average net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for soyabean

MARKETS	YEARS							
	2007	2008	2009	2010	2011	2012	2013	2014
GIWA	-17.08	14.75	-5.75	-21.92	13.33	30	-6.17	37.92
IKARA	-10.5	21.5	-6.08	-13.92	12.17	17.25	-4.67	16.83
PAMBEGUA	12.75	42	0.42	-17.08	39	37.75	-5.25	39.25
FUNTUA	-21.08	12.67	10.75	-4.58	11.92	38.08	44.25	45.33
DANDUME	-29.5	4.583	0.67	-19.5	1.83	23.25	23.17	38.25
DANJA	12.08	2	-7.67	4.83	28.5	16.92	10.33	26
DAWANAU	13.5	71.5	27	1.25	28.5	32.5	17.83	32.5

4.6 **Constraints to Food Grains Marketing in the Study Area**

Table 18 shows the constraints to food grain marketing across the markets investigated. The problems were ranked according to the order of seriousness as mentioned by the respondents. The following are some of the constraints to food grain marketing across the selected markets:

i. **Transportation problem**: This is ranked first and (30%) of the food grain marketers mentioned this as one of their major constraints. This is because transport facilities are grossly inadequate, especially in the rural areas where most food grains are produced. Motorable roads are lacking and where available, they are not in good condition. This makes it difficult for vehicles to get to the farm sites and convey farm produce to the markets. The bad roads have increased post- harvest losses through damage to farm produce. This finding is in line with Labaris *et al.,* (2013), who opined that most food grain marketers had faced the transportation challenges of guinea corn marketing in Nasarawa state.

ii. **Inadequate market infrastructure**: (27%) of the food grain marketers indicated inadequate market infrastructure as their constraint which ranked second. Facilities such as clean environment and health facilities, fire services, banking facilities, security facilities, water supply and good toilets are also lacking in most rural market. This finding is in line with Labaris *et al.,* (2013), who opined that most food grain marketers had faced the Infrastructures as threats to guinea corn marketing in Nasarawa state.

iii. **Poor storage facilities:** (26%) of the marketers indicate poor storage facilities as constraints across the markets investigated. This constraint has been ranked third among other constraints. Some of the respondents said modern storage facilities are not readily available and where available, they are very expensive. Good storage and warehousing facilities such as lock-up stores, silos, barns are lacking in most of these markets. This finding is in line with Labaris *et al.,* (2013), who opined that most food grain marketers had faced the storage facilities as constraint to guinea corn marketing in Nasarawa state.

iv. **Lack of uniform measure**: (17%) of the respondents mentioned this, and is ranked fourth among their constraints. Food grains are measure with varying units of different sizes from market to market. This posed some problems to traders because some traders find it difficult to convert the units accurately so as to know the exact price of the commodity. This finding is in line with Labaris *et al.,* (2013), who opined that most food grain marketers had faced the uniform measure as problem to guinea corn marketing in Nasarawa state.

Table 18: Marketing constraints faced by food grain marketers

Constraining Factors	*Frequency	Percentage	Rank
Transportation problems	140	30	1st
Inadequate market infrastructure	132	27	2nd
Poor storage facilities	122	26	3rd
Lack of Uniform Measures	78	17	4th

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study focused on the analysis of spatial and temporal price efficiency of some selected food grains marketing in three states of North West Nigeria. Specifically, the study was made to describe socio-economic characteristics of food grains marketers (Wholesalers), determine the marketing margin of food grains marketing, describe the trend in the price of some selected food grains marketing, estimates inter market price differentials in relation to transport and other transaction costs, examine the significance of storage cost as a factor in explaining seasonal price variation, and describe the constraint to food grains marketing in the study area. Seven markets were purposively selected from three states of the region. Two hundred and two respondents were selected randomly from the initial stage but only one hundred and ninety six questionnaires returned and treated for the study.

Primary and secondary data were used for the study. Primary data were collected from 196 respondents with the aid of structured questionnaire. Secondary data were obtained from the Agricultural development programme office (ADPs), of the three selected states and National agricultural extension research and liaison service (NAERLS), A.B.U, Zaria which covered the wholesale monthly prices for 96 months (2007-2014). The analytical tools used to analyze the data were descriptive statistics, marketing margin model, spatial price model and temporal price model.

The result of the socio-economic analysis shows that 53% of the respondents fall within the age range of 41-50 years and majority of the marketers 61% had no formal education and also 50% of the respondents had between twenty one to thirty years (21-30) of marketing experience. Also, majority of the respondents 59% financed their business through personal savings.

Analysis of spatial aspects of price efficiency show that the expected and actual price spreads between Dawanau and six selected supplying markets indicate that in 1570 out of 2304 instances, the positive price spread is high. This high positive spreads implies an imperfection and inefficiency in the marketing system across the selected markets studied.

Analysis of temporal price relationships indicated that seasonal price increases commonly exceeded cost of storage for rice, cowpea and soyabean which provided the opportunity to make more than normal profit. Considerable risk was involved in storage operations to achieve high profits. For maize, however, the seasonal prices increases were less than the cost of storage across the years of investigation, thus indicating losses in the storage of the grain. Commercial storage is not feasible if the seasonal price differences between the time of purchasing (storage) and the time of selling is not sufficient to cover costs and offer profit as an economic incentive. Finally, among the constraints identified in the study area were transportation problems, inadequate market infrastructure, poor storage facilities for grain marketing, and lack of uniform measures.

5.2 Conclusion

Based on the findings of this study, it can be concluded that the marketing margins of the selected food grain markets in the study area are inefficient. This is because the marketers (wholesalers) were recorded high margins in most part of the study across the selected markets which are an indication of market ineffiencies and imperfection in the system.

The analysis of inter-market price relationship showed that price spreads of food grains among different markets is dominated with the positive spreads of 1570. The appearance of unusually high positive spreads may be attributed to several factors including, lack of adequate market information, traditional buying and selling practices that condition traders to buy and sell grain only in specific markets regardless of prevailing prices, poor road infrastructure, temporary unavailability of transportation services, high market risks. Although there was a high degree of competition within the sub-systems or local markets, this analysis indicates some lack of competition between the sub-systems. However, the evidence strongly suggests that these larger price differences among markets did not result from planned manipulation under monopolistic or monopsonistic conditions, but rather that they were a result of imperfections inherent in the system due to feature of production and marketing system which make effective response to inter-market price differentials difficult.

Seasonal price increases in many parts of the study exceed the costs of storage, providing the opportunity for those who stored grain to make a higher profit, even though there is an exception in the storage of maize where the cost of storage exceed the seasonal price increase. However, the extent of traders' skill to make storage decision depend on considerable element of risk involved in storage operations, demonstrated by the variable timing required in marketing in order to achieve higher profits. Other findings in the study suggest that the traders do not have the monopolistic power to influence prices through their storage operations and thus earn higher profits. The main constraints identified by respondents in the study area included transportation problems, inadequate market infrastructure, poor storage facilities and lack of uniform measures.

5.3 Recommendations

From the findings of this study, the following recommendations were made:

1. The government should improved pricing efficiency for food, and increased consumer satisfaction through instituting pricing and economic incentive-creating schemes for producers through such policies as subsidies and tax dispensations for inputs and the establishment of the standardised grades for food grains in the study area. This would help to reduce the problem of price fluctuation discovered in the study area.

2. Government, preferably with the involvement of communities, as well as local contractors and technician should embark on planning, construction, rehabilitation and maintenance of rural feeder roads. This will minimise problem faced by marketers and allow for easy flow of food grain from the rural markets to urban markets where the demand is high. It will also, minimise the price spread among different markets in the study areas.

3. The government, with the help of farmers and the marketers, should provide for more and better dissemination of market intelligence among farmers and traders to improve knowledge, combat uncertainties concerning supply and demand and decrease the risk associated with inter-market trade. There is thus, a need for the farmers and the marketers to further diversify the extension of global mobile phone system to remote areas to facilitate farmer to farmer and trader to trader contact from distant places. This would help to reduce price uncertainty as well as the seasonal price increases.

4. There is also need for government and the marketers to undertake adopted research programme capable of improving infrastructures and storage system in the study area. Simple processing and storage technologies which minimize cash and capital input should be accessible to farmers and traders as well.

5.4 Contribution of the Study to Knowledge

i. The result revealed that the average margin of wholesale price across the markets studied was ₦6,286 for maize, ₦15,000 for mill rice, ₦16,143 for cowpea and ₦13,571 for soyabean per ton. These highest margin recorded across the seven markets studied implies that more than a profit is being made in the trade and some elements are duly reaping from the effort of others.

ii. The study revealed that the net seasonal rise in price of food grains between the expected and observed ranged from -₦76 to ₦88 for maize, -₦8 to ₦57 for rice, -₦88 to ₦142 for cowpea and -₦13 to ₦115 for soyabeans. This indicated inefficiency in the seasonal price rise as a factor in explaining cost of storage.

iii. The study also revealed that the major constraints to food grain marketing were transportation problems (30%), inadequate marketing infrastructure (27%) and poor storage facilities which constitute (26%) of the total constraints.

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Appendices

Appendix 1

Sex distribution of the respondent

Sex	Frequency	Percentage
Male	196	100
Female	0	0
Total	196	100

Distribution of marital status of the respondent

Marital Status	Frequency	Percentage
Single	0	0
Married	196	100
Total	196	

Appendix 2

Table 14: Net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for maize

Markets	O	N	D	J	F	M	A	M	J	J	A	S	AVE
						2007							
GW	0	-10	-3	5	5	-3	-3	12	12	20	27	35	8.08
IKR	0	-9	-1	7	11	3	3	7	-1	11	1	11	3.58
PG	0	-11	-3	5	5	-3	12	12	12	19	27	34	9.08
FTA	0	11	6	3	-13	-20	-29	-30	-15	-9	-7	0	-8.58
DD	0	21	16	13	-5	-13	-22	-24	-8	-2	0	9	-1.25
DJA	0	-24	-18	-15	-3	-11	-21	-23	-6	0	3	11	-8.92
DWN	0	-10	-3	5	5	-3	-3	-15	-11	19	11	23	1.91
						2008							
GW	0	-11	-26	-18	7	-10	4	1	-14	-14	-18	-7	-8.83
IKR	0	-14	3	3	9	13	6	3	17	17	20	20	8.08
PG	0	-26	-19	-10	-1	-4	-3	-6	7	-7	-38	-38	-12.1
FTA	0	-22	-27	-31	-32	-41	-46	57	36	39	34	31	-0.17
DD	0	33	38	42	44	53	-59	-71	-48	-52	-46	42	-2
DJA	0	36	41	45	47	57	-63	-74	-51	-55	-49	-45	-9.25
DWN	0	-21	-28	-23	-36	-69	69	72	3	5	8	5	-1.25
						2009							
GW	0	-1	-21	0	-1	-14	-18	-21	34	24	-18	14	-1.83
IKR	0	12	9	2	-4	11	5	-4	-4	-10	-20	-20	-1.92
PG	0	9	9	9	22	-9	-9	-22	-18	-22	-9	-9	-4.08
FTA	0	40	30	31	-24	-14	-39	-14	-24	-30	-37	55	-2.17
DD	0	63	80	82	78	73	-88	-111	-103	-89	-80	-80	-14.6
DJA	0	-66	-83	-85	-81	76	91	-115	-107	93	92	83	-8.5
DWN	0	14	33	-30	-42	41	41	13	-27	-26	-40	-41	-5.33
						2010							
GW	0	26	19	10	7	10	4	7	1	-23	1	7	5.75
IKR	0	-20	-20	-11	-4	-4	-4	-4	-4	12	5	-4	-4.83
PG	0	51	46	46	34	34	34	51	51	34	48	48	39.75
FTA	0	48	52	46	30	14	30	15	14	4	-3	13	21.92
DD	0	71	75	84	50	50	50	69	62	69	61	52	57.75
DJA	0	57	61	69	73	80	92	88	75	36	48	40	59.92
DWN	0	2	3	5	6	71	22	34	35	69	23	11	23.42

Table 14: Net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for maize, (Ct'd)

Markets	O	N	D	J	F	M	A	M	J	J	A	S	AVE
						2011							
GW	0	9	3	-5	-8	-5	-10	-8	-13	-16	-13	-7	-6.08
IKR	0	-11	2	-4	-4	-11	-10	5	-4	-4	-11	11	-3.42
PG	0	-19	-15	15	6	-6	-6	19	-19	6	-16	-16	-4.25
FTA	0	15	18	25	-39	-45	-29	-23	13	13	-3	-3	-4.83
DD	0	44	37	-49	-30	-69	-50	43	43	32	-32	-84	-9.58
DJA	0	23	26	34	38	55	73	93	85	78	72	69	53.83
DWN	0	1	33	23	19	29	29	38	10	4	-9	-2	14.58
						2012							
GW	0	-22	-24	-23	-27	-22	-7	4	17	12	4	20	-5.67
IKR	0	-2	9	9	-5	-6	-6	-6	-6	-6	-6	-6	-2.58
PG	0	-20	-27	-21	6	3	6	-19	-19	-19	19	-27	-9.83
FTA	0	11	14	14	11	13	28	35	27	43	43	41	23.33
DD	0	-44	-37	-29	-25	24	29	35	-27	-36	-49	-41	-16.7
DJA	0	57	-49	-40	-36	-35	-40	45	92	-73	-62	-54	-16.3
DWN	0	-12	-16	-22	32	36	-42	-42	-52	23	23	-12	-7
						2013							
GW	0	-22	-9	-7	2	-9	-22	-27	-35	2	2	4	-10.1
IKR	0	3	7	12	12	12	12	12	12	12	12	12	9.83
PG	0	-13	9	2	0	-1	-2	-11	-3	-2	-2	-1	-2
FTA	0	-33	-35	-30	28	27	25	22	-19	-20	-24	-27	-7.17
DD	0	-33	-34	-39	-28	-27	-25	22	19	20	-42	-42	-17.4
DJA	0	-45	-47	-41	-40	38	36	33	-30	-31	-48	-73	-20.7
DWN	0	-21	-21	33	-33	-37	-66	76	66	-48	-54	-54	-13.3
						2014							
GW	0	-9	-9	-9	-14	-9	-11	-4	-2	1	-1	16	-4.25
IKR	0	-13	-13	-13	-13	-18	-13	-16	-8	-7	-4	-6	-10.3
PG	0	-15	-15	-15	-15	-20	-15	-18	-11	-9	-6	-8	-12.3
FTA	0	-28	27	-31	-24	18	-12	-16	-12	9	-4	-9	-6.83
DD	0	49	-47	-52	-44	-37	30	34	-30	-27	-20	-27	-14.3
DJA	0	-50	49	53	-45	-38	-31	-36	-31	-28	21	28	-9
DWN	0	-54	-56	-56	70	72	-76	-66	-60	-58	-46	41	-24.1

GW=Giwa, IKR=Ikara, PG=Pambegua, FTA=Funtua, DD=Dandume, DJA=Danja and DWN=Dawanau

Table 15: Net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for rice

Markets	A	S	O	N	D	J	F	M	A	M	J	J	AVE
						2007							
GW	0	22	33	32	31	33	36	36	33	32	18	23	27.42
IKR	0	43	56	56	54	56	54	51	57	55	50	45	48.08
PG	0	23	34	32	31	34	37	34	34	12	17	16	25.33
FTA	0	15	23	26	27	29	31	32	29	19	19	12	21.83
DD	0	14	23	23	26	29	31	32	29	19	18	16	21.67
DJA	0	14	23	26	26	29	31	32	29	19	19	16	22
DWN	0	9	10	9	10	14	13	12	14	11	14	9	10.42
						2008							
GW	0	24	25	25	25	31	32	32	32	32	38	32	27.33
IKR	0	39	44	46	46	46	43	39	36	34	30	30	36.08
PG	0	4	16	17	17	23	24	12	21	24	26	27	17.58
FTA	0	23	27	26	27	27	26	24	19	17	15	12	20.25
DD	0	23	26	26	27	26	25	24	18	17	15	12	19.92
DJA	0	23	26	26	26	27	26	26	24	19	17	15	21.25
DWN	0	11	9	9	10	11	14	16	16	13	16	10	11.25
						2009							
GW	0	27	29	23	23	21	23	25	25	25	31	32	23.67
IKR	0	22	23	14	10	6	6	10	10	14	14	23	12.67
PG	0	20	20	20	20	20	20	20	20	21	21	22	18.67
FTA	0	11	13	16	19	19	22	22	24	24	27	30	18.92
DD	0	11	13	16	19	19	22	22	23	23	26	30	18.67
DJA	0	11	13	16	18	19	22	22	23	23	26	30	18.58
DWN	0	9	9	5	5	15	11	0	17	4	12	15	8.5
						2010							
GW	0	25	25	25	30	31	29	29	30	31	25	25	25.42
IKR	0	22	19	14	30	38	41	46	54	51	54	52	35.08
PG	0	15	12	12	12	10	10	11	11	16	15	20	12
FTA	0	29	27	30	34	37	37	40	38	34	32	31	30.75
DD	0	28	29	31	25	22	26	26	33	33	34	32	26.58
DJA	0	28	38	39	37	35	35	35	37	33	31	40	32.33
DWN	0	8	9	9	7	5	6	7	4	2	9	-2	5.33

Table 15: Net Seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for rice (Ct'd)

Markets	A	S	O	N	D	J	F	M	A	M	J	J	AVE
						2011							
GW	0	27	20	17	16	14	10	10	17	21	22	22	16.33
IKR	0	25	25	24	19	16	16	19	21	25	25	25	20
PG	0	9	9	9	9	9	9	10	9	7	9	2	7.58
FTA	0	31	26	26	30	26	26	20	20	25	26	26	23.5
DD	0	33	33	33	31	32	33	32	31	26	26	28	28.17
DJA	0	50	50	49	49	54	40	47	40	38	37	34	40.67
DWN	0	11	10	10	14	4	9	4	2	1	-1	-2	5.17
						2012							
GW	0	29	29	32	32	30	30	25	22	22	20	20	24.25
IKR	0	28	27	27	25	25	21	20	18	18	19	19	20.58
PG	0	9	9	9	15	15	16	17	14	14	9	15	11.83
FTA	0	30	31	37	33	31	33	36	36	39	34	33	31.08
DD	0	13	15	13	10	15	16	18	13	10	10	10	11.92
DJA	0	31	37	40	40	37	37	32	39	40	40	40	34.42
DWN	0	1	3	3	1	1	1	3	3	3	3	4	2.17
						2013							
GW	0	22	22	29	22	22	22	30	29	31	32	31	24.33
IKR	0	25	25	23	18	18	16	15	10	12	25	25	17.67
PB	0	17	16	15	15	17	18	-3	-9	17	-28	-28	1.08
FTA	0	23	23	25	25	23	21	17	13	14	11	10	17.08
DD	0	11	12	15	14	15	13	12	16	18	13	10	12.42
DJA	0	41	42	40	26	26	26	33	38	34	33	29	30.67
DWN	0	5	3	-7	-7	-7	-2	2	-1	-2	-5	-8	-2.42
						2014							
GW	0	23	22	21	21	23	24	2	-3	18	-24	-24	5.58
IKR	0	31	27	18	18	10	10	17	10	7	3	-4	12.25
PG	0	9	18	15	15	18	19	19	18	19	16	15	15.08
FTA	0	27	27	27	28	27	24	23	23	27	28	28	24.08
DD	0	12	19	19	20	16	16	17	19	19	20	16	16.08
DJA	0	10	10	10	16	16	16	16	19	19	17	17	13.83
DWN	0	-7	-7	-2	-2	-2	-2	1	0	-1	-1	2	-1.75

GW=Giwa, IKR=Ikara, PG=Pambegua, FTA=Funtua, DD=Dandume, DJA=Danja and DWN=Dawanau

Table 16: Net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for cowpea

Markets	J	F	M	A	M	J	J	A	S	O	N	D	AVE
						2007							
GW	0	-8	0	0	-8	0	23	54	15	25	31	77	17.42
IKR	0	-2	-5	2	0	-10	-20	38	4	12	17	58	7.83
PG	0	-15	-8	-8	-1	-8	-11	-3	6	15	20	62	4.08
FTA	0	-2	-2	8	47	57	57	57	67	77	73	45	40.33
DD	0	7	15	17	18	20	22	23	20	11	10	9	14.33
DJA	0	-18	-18	-10	22	31	31	31	39	47	44	46	20.42
DWN	0	-12	-13	-13	-10	-4	-2	7	10	25	28	78	7.83
						2008							
GW	0	38	66	55	77	94	27	16	16	12	11	11	35.25
IKR	0	72	107	93	121	142	69	69	47	55	59	64	74.83
PG	0	77	112	98	126	148	63	49	49	43	41	41	70.58
FTA	0	27	41	34	34	27	28	41	55	69	76	77	42.42
DD	0	14	18	17	18	18	17	15	11	9	7	5	12.42
DJA	0	47	63	55	55	47	49	63	80	96	104	105	63.67
DWN	0	73	95	89	89	120	68	35	20	-2	-4	5	49
						2009							
GW	0	55	66	77	77	88	88	66	44	45	30	38	56.17
IKR	0	82	95	108	108	121	121	95	69	71	75	62	83.92
PG	0	46	56	67	67	77	77	56	35	37	40	30	49
FTA	0	83	76	69	76	55	41	41	35	35	32	34	48.08
DD	0	6	6	8	3	1	4	4	10	10	10	13	6.25
DJA	0	60	53	47	53	35	23	29	39	35	47	53	39.5
DWN	0	6	14	37	23	68	40	32	25	30	16	11	25.12
						2010							
GW	0	44	55	66	66	50	55	22	33	36	22	22	39.25
IKR	0	69	82	95	95	75	82	57	53	47	43	43	61.75
PG	0	35	46	56	56	41	46	15	25	28	15	15	31.5
FTA	0	33	26	33	36	39	40	54	47	40	54	68	39.17
DD	0	6	6	8	3	1	4	4	10	10	10	13	6.25
DJA	0	48	35	29	23	21	23	35	29	23	35	47	29.00
DWN	0	20	21	37	37	20	9	8	8	7	7	-2	14.33

Table 16: Net seasonal rise in price express as a percentage greater (or less) than expected price from 2007-2014 for cowpea (Ct'd)

Markets	J	F	M	A	M	J	J	A	S	O	N	D	AVE
						2011							
GW	0	21	33	49	47	47	49	63	76	77	70	59	49.25
IKR	0	42	59	78	75	75	78	94	110	107	102	89	75.75
PG	0	14	27	42	39	39	42	55	68	65	61	51	41.92
FTA	0	58	67	67	68	68	68	67	67	66	61	62	59.92
DD	0	10	10	10	8	9	10	9	8	4	4	6	7.33
DJA	0	38	46	46	47	47	47	46	46	45	42	42	41
DWN	0	7	2	5	13	26	11	27	37	46	46	37	21.42
						2012							
GW	0	63	56	56	53	63	83	90	106	101	94	70	69.58
IKR	0	55	51	49	46	55	75	81	79	92	85	81	62.42
PG	0	54	50	48	45	54	74	80	95	90	84	80	62.83
FTA	0	63	61	61	60	63	61	59	53	53	53	53	53.33
DD	0	7	9	6	3	9	10	11	6	3	3	4	5.92
DJA	0	44	42	42	42	44	42	40	35	35	35	35	36.3
DWN	0	31	20	26	31	41	36	29	26	20	29	16	25.42
						2013							
GW	0	59	60	71	67	67	91	67	69	61	43	46	58.42
IKR	0	72	73	85	81	75	81	81	84	74	53	58	68.08
PG	0	51	53	63	65	59	82	59	62	54	37	39	52
FTA	0	-87	-87	-84	-89	-85	-85	-86	-86	-85	-85	-87	-78.83
DD	0	-1	0	2	1	2	1	0	3	4	1	-2	0.92
DJA	0	23	22	36	42	42	36	31	31	36	36	20	29.58
DWN	0	9	9	9	15	19	19	20	22	25	36	36	18.25
						2014							
GW	0	49	55	58	62	74	61	58	59	50	46	49	51.75
IKR	0	35	30	24	20	20	19	14	10	2	12	11	16.42
PG	0	42	48	51	54	66	54	50	51	43	37	42	44.83
FTA	0	-86	-87	-87	-87	-87	-88	-86	-86	-85	-85	-84	-79
DD	0	4	6	6	7	3	3	4	4	6	6	4	4.42
DJA	0	25	20	20	25	19	9	31	31	41	41	47	25.75
DWN	0	33	30	33	33	18	13	13	-2	-2	3	3	14.58

GW=Giwa, IKR=Ikara, PG=Pambegua, FTA=Funtua, DD=Dandume, DJA=Danja and DWN=Dawanau

Appendix 3

(A) Personal Details

1. Name ……
2. Sex: (i) Male [ ] (ii) Female [ ]
3. Age of the marketer …….
4. Marital Status: (i) Married [ ] (ii) Single [ ]
5. Level of Education

(i) No formal education ( )
(ii) Primary ( )…… (Years)
(iii) Secondary ( )…… (Years)
(iv) Tertiary ( )…… (Years)

6. Major Source of Income……
7. Years of Experience in Grains Marketing……
8. Do you belong to any Association?
   ……
9. If yes, how many associations do you belong?
   .....
10. What is the Name of the Association?
    ……
11. What are the main Activities of the Association?
    ……
12. How many years have you spent in the association?
    ……
13. If your response to (8) above is no, give reasons for not belong to any Association?
    ……
    ……
    ……
    ……
14. Major occupation?
    ……
15. Commodities Traded

(i) Rice ( )
(ii) Maize ( )
(iii) Cow-Pea ( )
(iv) Soya-Beans ( )

(B) Marketing Margin Information

16. What is the producers price for one bag of rice?
……
17. What is the producers price for one bag of Maize?
……
18. What is the producers price for one bag of cowpea?
……
19. What is the producers price for one bag of soya beans?
……
20. What is the final consumers price for one bag of rice?
……
21. What is the final consumers price for one bag of maize?
……
22. What is the final consumers price for one bag of cowpea?
……
23. What is the final consumers price for one bag of soya beans?
……

(C) **Transportation Cost Information**

24. How far is/are the place(s) you buy your grains from the production market(s)
……
25. What is the cost of transportation?
……
26. How far is/are the market(s) you sell your grains
……
27. What is the cost of transportation?
……
28. What is your means of transportation?
……

29. Are there formal transport tariffs related to the grain? Yes ( ) No ( )

30. Indicate the transportation cost you incur in moving one bag of your grain for the last eight years (specify the crop)…….

Years	Cost of Transportation of moving a 100kg bag of Grains (Naira/tonne)
2007	
2008	
2009	
2010	
2011	
2013	
2014	

(D) Storage Information

31. What is the cost of storing 1 bag of rice for one season?
    ……
32. What is the cost of storing 1 bag of maize for one season?
    ……
33. What is the cost of storing 1 bag of soya beans for one season?
    …….....
34. What is the cost of storing 1 bag of cowpea for one season?
    ……....
35. What are your constraints to storage of food grains marketing in your area?
    ……
36. How long do you store your grains before sale?
    …….
37. What are your reasons for storage before sale?
    ……
38. Indicate how much you pay as a rent for storing one bag of food grains you traded for the last eight year (specify the crop)
    ……..

Years	Cost of Rent used for Storing One bag of Grains (₦/bag)
2007	
2008	
2009	
2010	
2011	
2013	
2014	

39. Indicate the cost of chemicals used in storing one bag of food grain you traded for the last eight years (Specify the crop)
    ……..

Years	Cost of Chemical used for Storing One bag (₦/bag)
2007	
2008	
2009	
2010	
2011	
2013	
2014	

(E) Handling Cost Information

40. How are loading and off-loading of your grains are organized?
……..

41. Indicate the handling cost you incur in moving one bag of food grains for the last eight years (Specify the crop)
……

Handling cost component	Years							
	2007	2008	2009	2010	2011	2012	2013	2014
Labour employed to fill the bags and stitch								
Loading								
Off loading								
Cost of packaging material								
Taxes and fees								
Total handling cost (₦)								

(F) Assembling Cost Information

42. Provide the information on cost of assembling your grains in the last eight years? (Specify the crop)
……

Years	Cost of assemblers of One bag food grains (₦/tonne)
2007	
2008	
2009	
2010	
2011	
2013	
2014	

(G)Market Information Details

1. Do you actively seek for market information? Yes ( ) No ( )

2. Whom do you obtain marketing information from especially those related to price?
……...

3. How quickly is market information obtained?
……

4. Are the information reliable? Yes ( ) No ( )

(H) Constraints To Food Grains Marketing

5. What are the constraints to food grains marketing in the study area?
……
6. How can these problems be solved?
…….