VALUE CHAIN ANALYSIS OF RICE (*Oryza sativa*) IN KANO RIVER IRRIGATION PROJECT (KRIP) KANO STATE, NIGERIA

By

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY DEGREE IN AGRICULTURAL ECONOMICS.

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DECEMBER, 2015

DECLARATION

I hereby declare that this thesis titled **"Value Chain Analysis of Rice (*Oryza sativa*) in Kano River Irrigation Project (KRIP) Kano State, Nigeria"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been duly acknowledged in the text and a list of references provided.

Isma'ila Yunusa ILU
Student

Date

CERTIFICATION

This thesis titled **"Value Chain Analysis of Rice (*Oryza sativa*) in Kano River Irrigation Project (KRIP) Kano State, Nigeria"** by Isma'ila Yunusa ILU meets the regulations governing the award of the Degree of Doctor of Philosophy of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation

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DEDICATION

This Research work is dedicated to my late grandfather, Alhaji Yunusa Mohammed Bashir and my grandmother Hajiya Maimuna Mohammed Ngelele, who laid the foundation of my education and then to the rice value chain actors, who tolerated our un-ending stream of questions.

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ABBREVIATIONS

ABU	Ahmadu Bello University
ADENI	Agricultural Development in Nigeria
AMS	Associated Marketing Services
BOA	Bank of Agriculture
CBOs	Community Base Organizations
CCA	Commodity Chain Analysis
CIRAD	Center de cooperation Internationale en Reserche Agronomique pour le Development
DFID	Department for International Development, United Kingdom
FDI	Foreign Direct Investment
FGN	Federal Government of Nigeria
FMARD	Federal Ministry of Agriculture and rural Development
FMAWR	Federal Ministry of Agriculture and Water Resources
GDP	Gross Domestic Product
GCC	Global Commodity Chain
GTZ	German Agency for Technical Cooperation
INRA	Institute National de la Researche Agropnomique
KNARDA	Kano Agricultural and Rural Development Authority
KRIP	Kano river Irrigation Project
MDG	Millennium Development Goal
MAPS	Multi-agency Partnerships for Technical Change in West Africa
M4P	Making Markets Work for the Poor

NAERLS	National Agricultural Extension and Research Liaison Services
NBS	National Bureau of Statistics
NGOs	Non Governmental Organizations
NISER	Nigeria Institute of Social and Economic Research
NRDS	National Rice Development Strategy
OAC	Organization of African Countries
ODI	Overseas Development Institute
OECD	Organization of Economic Cooperation and Development
PROPCOM	Promoting Pro-poor Opportunisms in Commodity and Service Markets
R-BOX	Rice Box
SME	Small and Medium Enterprises
UNICEF	United Nations Children Education Fund
UNIDO	United Nations Industrial Development Organization
UNDP	United Nation Development Project
USAID	United State Agency for International Development
USD	United States Agency for Development
WARDA	West Africa's Rice Development Association

ABSTRACT

Poverty and youth unemployment remained a challenge in Nigeria's economic development. Interventions initiated to curb the menace have failed. The Federal Ministry of Agriculture and Rural Development adopted the value chain approach to implement the agricultural transformation agenda in 2011. This study was conducted to identify the major value chain actors, their activities, value creation and its distribution in Kano River Irrigation Project (KRIP) of Kano State, Nigeria. Probability random sampling was used to identify respondents. Primary and secondary data were used in the study. Descriptive statistics, conjoint analysis, budgeting technique and commodity chain analysis were used. Descriptive statistics and budgeting techniques were use to organize the socioeconomic data. Conjoint analysis was specifically used to identify consumer preference. The commodity chain analysis technique was used to assess the value added by major actors along the value chain. The major rice value chain actors include; inputs dealers, farmers, paddy traders, parboilers, millers, milled rice marketers and consumers. Majority of the sampled input dealers, farmers, paddy traders, millers and milled rice marketers were male. Majority of the parboilers were women. Most of the actors, except parboilers, were literate. But all the actors belong to business associations, even though not all of them reap the benefit of their membership. The average farm holdings was 2.6 hectares with yield of about 2.9 tons/ha. More than 80 percent of the estimated 189,630 tons of paddy produced in the study area is sold. The remaining is used for home consumption and seeds. About 156,000 tons of paddy is injected into the market through wholesalers (65%), rural assemblers (15%) and rural retailers (2%). The paddy moved to the millers for milling. The milled rice is sold to both urban and rural wholesalers. It is then sold to consumers through rural and urban retailers. Rice production was profitable in the study area. A total ₦120,000 is realized from one hectare of rice profit as ₦200,000. The marketers realized a net margin of ₦50 from a bag of paddy. Parboilers obtained a profit of ₦50 on every bag of paddy. The value added by the farmer to a bag was ₦3,700. The paddy assembler added ₦400 to it, the parboilers added ₦57 and the miller added ₦122 to it. Low price of paddy, limited access to credit, shortage of labour, erratic supply of electricity, high cost of fertilizer and marketing were the major constraints impacting negatively on the rice value chain actors in the study area. It is recommended that major rice value chain actors' accessibility to appropriate technology should be enhanced by development agencies to improve productivity and reduce operating costs. The millers and marketers should be introduced to joint-venture projects by development agencies, to pool resources to acquire and manage joint assets. This will lead to improved quality, reduced cost and improved earnings to the parties involved. Price is the most important variable that influenced consumer preference, efforts should be made by development agencies to reduce cost of doing business along the value chain in order to increase demand for local rice.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background To The Study

Nigeria, with an estimated population of over 177 million people, is the largest black nation on earth (World Bank, 2014). It constitutes about one fifth of the total population of Sub-Saharan Africa. Nigeria is richly endowed with vast human, physical, and natural resources. The population is not only large, but vibrant, active and talented. As at 2012, Nigeria's adult literacy was 52 percent on average, with a higher rate for men (78 %) than for women (60 %) (UNICEF, 2013). There are about 8 major and more than 250 ethnic groupings, each with its diverse cultural settings and unique potentials for development.

Nigeria is blessed with wide range of climatic, vegetation and soil conditions suitable for rich and diverse agricultural production. It has a total land area of 923,770 square kilometers, out of which 13,000 square kilometers is water and 910,770 square kilometers land. Forty-four percent of the land area is under permanent pasture, 33 percent under arable crop, 12 percent under forest and woodland 3 percent under permanent crop (Library of Congress, 2008). The country is endowed, not only with veritable agricultural land and natural resources, but with varied climate that is equatorial in south, tropical in the center and arid in the north. The diversity of species of plants and animals is indispensable for both domestic consumption and export.

However, despite the oil riches, agriculture still remains the leading sector in terms of employment in the Nigerian economy. Agriculture constitutes about 75 percent of the rural economic activities, and contributes about 40 percent to the GDP (FMARD, 2012). Before the advent of oil discovery in Nigeria, the economy was basically agrarian. Agriculture was the springboard of Nigeria's economic development from 1900 to 1960s. Agriculture was contributing more than 60 percent to the GDP with Nigeria as a major exporter of cotton, groundnut, cocoa, rubber and oil palm, in addition to being a major source of foreign exchange.

With the emergence of oil revenue in the seventies, additional impetus was given to the development of the manufacturing sector, which grew at a very rapid rate of 15 percent per annum. Within the same period, export of petroleum has gained momentum and started to replace export-agriculture as a source of government revenue. Thus in the 1970s, three leading sectors emerged; Agriculture, Manufacturing and Petroleum. However, despite its displacement by petroleum, as a source of government fund, agriculture still remained as the most important sector in Nigeria's economy due to the following reasons: First, petroleum export remained the exclusive preserve of government, as its main source of income. Secondly, the manufacturing sector contributes very little to the economy, as more than 70 percent of the proceeds, were sent abroad as factor payment (Manyong *et al.*, 2005).

Nigeria's dependence on oil export alone, made the economy vulnerable and susceptible to shocks generated by international oil prices. The collapse of oil prices of the 1980s was the beginning of Nigeria's economic problems. Revenue from oil export declined from $20 billion in 1980, to $10 billion in 1982. This led to Nigeria's inability to pay its short-term debts and purchase essential imports. The economy, which has already been weakened by corruption and mismanagement, sunk into severe recession (Alkali, 1997). Nigeria's food import bill rose steadily from ₦24 million in the mid 1950s to ₦47million, ₦126 million, ₦2 billion and ₦7 billion in 1960s, 1970s 1980s, 1990s respectively. By the year 2011, the import bill for Wheat, Rice, Sugar and Fish put together reached ₦1.31trillion (FMARD, 2011). Nigeria occupied the 13th position among the 20 poorest countries in the world, despite its 5th position among the richest world oil producers and exporters. Nigeria accounts for nearly a quarter of sub-Saharan Africa's poor (IFAD, 2009).

Rice is a staple crop in Nigeria, though grown everywhere, it is one of the imported crops. Nigeria‘s rice consumption has increased significantly over the last decade (6.5 % per annum) and is now estimated at 6 million metric tonnes annually and the total retail market value for rice in Nigeria was estimated at $3.6bn (FMARD, 2012). Furthermore, FMARD (2012) noted that rice has become a staple food of choice in both urban and rural areas accounting for more than 20% of all meals consumed per week by a typical household. Nigeria‘s growing demand for rice is forecasted to reach 36 million tons by 2050 (FMARD, 2012) is a potential source of income and employment generation in Nigeria given that rice can be grown in all ecologies of Nigeria. Thus it is significant to ascertain its value chain and the opportunity it can offer Nigeria in terms of employment and income generation.

According to Webber and Lebaste (2010), the value chain perspective provides an important means to understand business-to-business relationships that connect the chain, mechanisms for increasing efficiency, and ways to enable businesses to increase productivity and add value. It also provides a reference point for improvements in supporting services and the business environment. It can contribute to pro-poor initiatives and better linking of small businesses with the market. Increasingly, the value chain approach is being used to guide and drive high-impact and sustainable initiatives focused on improving productivity, competitiveness, entrepreneurship, and the growth of small and medium enterprises (SMEs).

1.2 Problem Statement

Poverty alleviation and curbing youth unemployment has remained an important challenge in Nigeria's economic development efforts since the 1980s. A number of interventions were initiated and implemented, especially since Nigeria's return to democratic rule in 1999. The cumulative effect of the interventions led to an impressive economic growth of about 6.9 percent and an agricultural growth of 8.2 percent (FMAWR, 2008), but failed to reduce poverty and youth unemployment to any appreciable level. In fact by 2010, poverty was by any measure, more severe and devastating than it was thirty years ago (NBS, 2012). The failure of the interventions was attributed to inherent weakness in the strategy of increasing productivity of the small scale farmers, without taking cognizance of the role market on the poor. In contrast, the value chain approach is a market-oriented approach that starts by identifying and then responding to changing customer needs. It is also a strategic network of individuals, independent organizations and businesses that work together, share the associated risks and benefits, and will invest time, energy and resources to make the relationship work. This influenced the Federal Ministry of Agriculture and Rural Development to adopt the value chain approach, as the operational strategy for the implementation of the agricultural transformation agenda (ATA) of the last administration's transformation agenda (FMARD, 2011).

The adoption of the value chain approach at national level poses a problem and concern of the availability of skilled manpower with the appropriate expertise and experience to operate the approach. Adopting the value chain approach amounts to grafting a market oriented approach on to a traditional food security system settings where; the operating environment, the policies, laws and regulations, institutional framework and basic elements such as research and extension, human resource development and other support services are all designed specifically to support the food security approach. The skill, knowledge, attitude and behavior of the stakeholders are attuned to executing the food security approach. The successful implementation of the value chain approach critically depends on the ability of the stakeholders (actors, supporters and promoters) to acquire, absorb, disseminate and apply new technological, organizational and institutional innovations in a continuous manner. In addition to that, the primary focus of the value chain, being a demand driven approach, is to effectively respond to changing customer needs through co-operation, communication and co-ordination.

This study is aimed at contributing to bridging the knowledge gap, to promote co-operation, co-ordination and communication among the value chain stakeholders, through answering some of the following questions;

i. Who are the major actors of the rice value chain?
ii. What are the socioeconomic characteristics of the major actors and what activities are they engaged in?
iii. What are the costs incurred and value-added by the actors along the value chain?
iv. What are the constraints limiting the potentials of rice value chain actors?

1.3 Objectives

The general objective of the study is to identify the value creation and its distribution among the major actors in the rice value chain. Other specific objectives are to:

i. describe the socioeconomic characteristics and activities of the major actors,
ii. identify and map out the flow of rice along the rice value chain,
iii. estimate the costs, margins and value added by major actors in the chain, and
iv. identify constraints confronting major actors at various levels along the chain.

1.4 Justification

The value chain approach has gained tremendous acclaim as a tool for addressing poverty problems in developing economies. It does this by focussing on major constraints and opportunities faced not only by farmers, but also by processors, traders and other business operators at multiple levels and points along the value chain. The process not only include more actors but it also covers wider range of activities such as, facilitating access to inputs, strengthening the delivery of business and financial services, enabling the flow of information and facilitating leveraging to higher-value markets. The cumulative effect of the activities collectively leads to the creation of more jobs and more income.

However the major challenge of the approach is that it is knowledge-based, highly demanding and its success depends on the quantum and rate of generation and dissemination of appropriate knowledge on challenges, problems and opportunities facing major actors and service providers along the value chain. The challenge is further compounded, where the skills of implementers and their support institutions; research, extension, credit and business development services are tilted towards the production oriented approach. The value chain approach is a strategic network of independent organizations and businesses, who recognize their mutual need for one another, to work together to identify strategic objectives and are willing to share the associated risks and benefits, and will invest time, energy and resources to make the relationship work (Amanor-Boadu, 2009). The process involves high level of trust between parties to the alliance. There is no room for an adversarial attitude toward suppliers or buyers. Competition for prices and more advantageous delivery conditions is not among actors within the alliance, but rather with other producers, processors, or distributors outside the value chain. Meyer-Stamer and Waltering (2007) used the "value chain metaphor" to illustrate the difference between the two approaches. They pointed out that the chain is a relatively flexible structure, which changes its form frequently without changing the basic structure. One fundamental physical feature of a chain is that it is impossible to move it by pushing it. The only way to move a chain is by pulling it. Therefore in a situation where most of the chain actors, their supporters and promoters only know how to "push" rather than "pull" then the end result can easily be predicted. The "chain" will remain stacked and entangled in one place.

In order to avoid such situation it is important to educate and impart the necessary skills and information needed by the value chain actors and stakeholders to survive in the demand driven environment. As such, the need to undertake study such as this one to generate local experiences and knowledge on value chain analysis, develop smallholder rice commercialization, provide relevant lessons and to disseminate the information to the stakeholders in rice value chain.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Rice in Nigeria Economy

Rice is one of the most important food and cash crops in Nigeria. It is the fourth largest cereal crop grown in the country behind sorghum, millet and maize. It is the second crop behind wheat, with the highest investment opportunity for import substitution. It was reported that Nigeria expends over USD$11 billion in the importation of wheat, rice, sugar and fish every year. Rice contributes about USD$3.56 billion to the amount (Akinwumi, 2012). Although Nigeria is Africa's leading producer of rice, it is also not only the leading consumer but is the second largest rice importer in the world. Rice has over the last three decades, witnessed steady increase in demand, estimated at 7 percent per annum. FMARD (2012) estimated that total demand would reach 9 million metric tonnes by the year 2016.The increase in demand is attributed to Nigeria's rapid urbanization, increase in population and income. Rice is primarily a cash crop to farmers and it generates more income for them than any other cash crop in the country (USAID, 2009).

The total rice industry, imports and domestic production, is valued at about $5 billion, with nearly $4 billion accruing inside Nigeria. About 2.5-3.0 million MT of rice is imported. Nigeria accounts for roughly 6 percent of the global rice trade. There is therefore a significant rice market in Nigeria, as rice is rapidly becoming the preferred staple food in the urban areas, due to its ease and short time of preparation. These rice attributes appealed to the ever increasing working women that are drawn into cities by rapid urbanization. As a result of which the annual per capita rice consumption exceeds 47 kg/capita (USAID, 2009).

Nigerian government policy heavily protects rice in order to stimulate import substitution. The Federal Government of Nigeria has either banned imports or placed very high duties (over 100 percent) on imported rice over much of the last decade. With the recent food crisis and tripling of the global price of rice in 2008, the FGN did cancel the duty for 6 months, but has since raised it back to 32.5 percent. However the tariff/levy combination that is applied to rice imports currently has had little effect in stimulating local production to a level of significant import substitution. In addition to the tariff protection, the FGN heavily subsidizes many of the inputs into the rice industry, including fertilizers and mechanization services, as well as credit. Unfortunately, aside from raising the cost of rice on the domestic market, there has not been a strong supply-side response to this favourable environment.

The value chain for domestically produced rice is currently dominated by a largely fragmented production and milling industry, with limited new investment in either production or processing. While the returns are quite high at each stage of the traditional value chain channel, there are so many participants in the channel that the benefits are spread very thin. With very high prices, a protected market and ever-increasing imports, the potential is high to promote a strong supply response under the right conditions. Some new investments in heavier milling capacity in new channels (i.e., Olam and Veetee private-sector mills) offer good private-sector driven models that can compete with imports for the high-end urban market, offer lower prices to consumers, yield high profit margins to both the producers and the millers and contribute to a more efficient value chain overall that improves food security in Nigeria (USAID, 2009).

Rice is grown in all the ecological zones in Nigeria, from the mangrove to the dry savannah. It is grown in all the 37 states of the Federation. It takes approximately about 3.7 million hectares of land in Nigeria, covering 10.6 percent of the 35 million hectares of land under cultivation, out of a total arable land area of 70 million hectares. More than 70 percent of the farmed area of rice is rain-fed, of which 47 percent is lowland and 30 percent upland (Bayou, 2009). Most rice farmers in Nigeria are smallholders (90 percent of total), applying a low-input strategy to agriculture, with minimum input requirements and low output (USAID, 2009). Nigeria rice productivity is among the lowest within neighboring countries, with average yields of 1.51 t/ha.

Paddy rice production has been increasing between 2001 and 2006, followed by a decline in 2007 and a positive peak in 2008. In 2007, the paddy production of 6 states constituted more than 60 percent of total domestic output: Niger (452,000 MT), Kaduna (347,000 MT), Benue (296,000 MT), Taraba (282,000 MT), Ebonyi (256,000 MT), and Kwara (234,000 MT). Despite the relative increase in yields, yielding performance remains below potential. Compared to those of neighbouring countries in the region (Benin, Cameroon, Chad, Ghana and Niger), Nigerian rice yields are among the lowest, superseded by yields in Benin, Ghana and Niger (Cadoni and Angelucci, 2013).

In spite of the fact that rice is cultivated in virtually all the agro-ecological zones in Nigeria, the area under rice cultivation remained small, yield remained the lowest in the region and quality of paddy remained poor due presence of stones, mixed varieties and broken seeds (NRDS, 2009). Beyond the farm gate, there are several issues that retard the downstream activities which are also constraining local supply of the commodity. These include issues such as the absence of standard measures in the marketing of rice, poor transportation services and lack of proper packaging materials and poor linkages to processing industries. Rice milling in Nigeria is at the cottage industry level. The milling capacity varies from 50 kg to 5,000 kg rice per hour. The most frequent type of mill encountered is the 'medium size' (150 to 300 kg/hr), which represents half of the sample, followed by the 'small size', the less frequent type of mills being the 'big size' and 'large size' (Lançon et al, 2003). These combined with large number of participants in the value coupled with on-farm constraints add up to undermine the competitiveness rice industry in Nigeria (Daramola, 2005.

2.2 The value chain approach

Value Chain is described as an analytical, as well as, an operational model. This is based on the premise that, in a modern economy a product is rarely directly consumed at the place where it is produced. Products are usually transported, transformed, combined with other products, packaged, transported, displayed etc. until it reaches the final consumer (Kohl and Uhl, 1990). In the process, intermediate products and final products are owned by various actors, linked by trade and services, and each adds value to the product. Various types of public and private services, like business development services, electricity, transport, financial services, etc., are as important as favourable enabling conditions, i.e. laws, regulations and their enforcement (Roduner, 2007). Through a good understanding of these interactions, interventions can be identified to;

- Increase efficiency and thereby increase total generated value, and to
- Improve the competence of actors to increase their share of the generated value.

More recently, governments and donors, realizing that upgrading the performance of individual firms can best be achieved in the context of market-based rewards for improved performance; have shown significant interest in value chain analysis and implementation. As such deliberate efforts were made to devise interventions that can help reposition entire industries, build business competitiveness, and spur economic growth. Governments and donors agencies use value chain–based approaches as robust tools to protect threatened links, facilitate upgrading of others to generate greater returns, and to promote foreign direct investment (FDI) programs. In addition to that, value chain analysis has been used to examine constraints in the enabling environment in which the chains operate. Value chains have also been used as a tool for small and medium enterprise (SME) development. New methods of linking SME suppliers and service providers to the value chains of lead processors or marketers are increasingly being used. More importantly, value chain analysis sheds light on the size of the firms participating in each link, how they are participating or could be participating in the chain, and opportunities to facilitate or improve those linkages. This is particularly crucial in agriculture, where governments and aid agencies are confronted with the challenge of including small farmers in modern value chains so that they can benefit from the globalization of markets. The value chain concept is therefore not only relevant to deal with growth, but also with the equity dimension of the modernization of the agric food systems (Webber and Labaste, 2010).

A major attraction of the value chain approach is its extended focus on all actors in the chain, rather than a segment of it. The approach takes cognisance of the extended networks of actors, activities, interactions and interdependence (Figure 2.1 and 2.2).

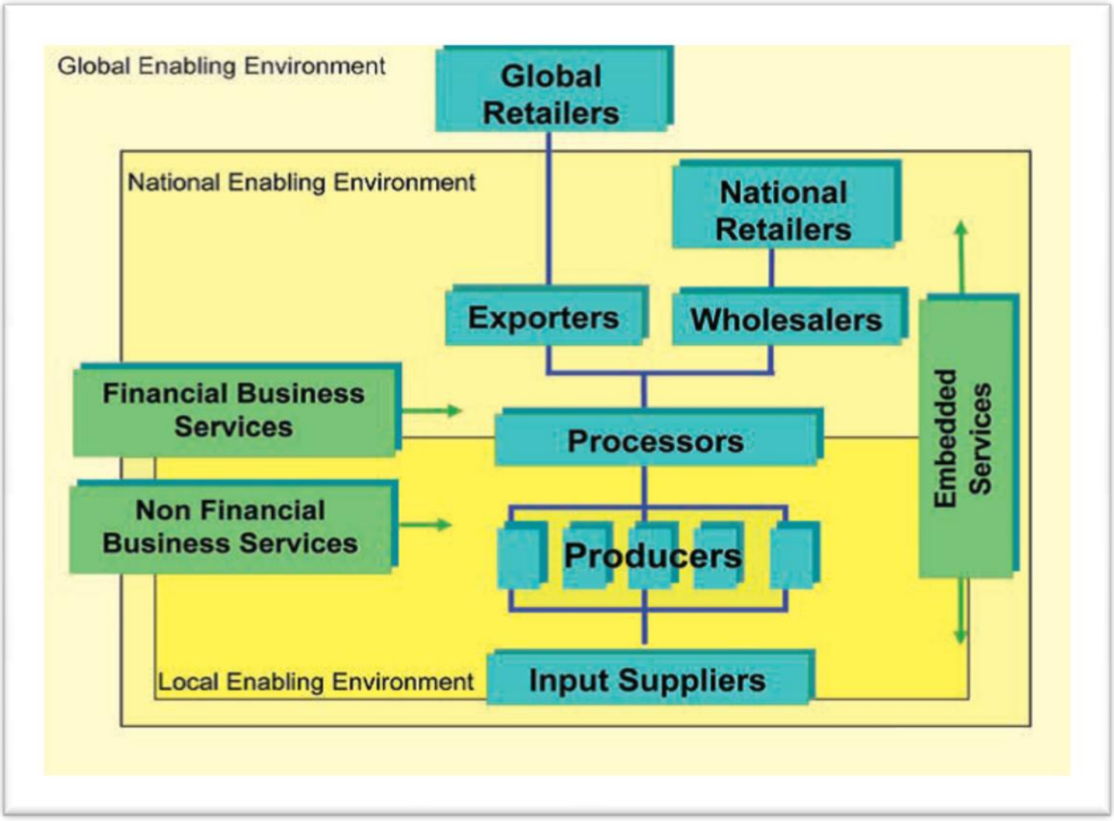


Figure 2.1: The value chain system (Adopted from USAID, 2006)

The value Links manual classified value chain stakeholders into three categories (Figure 2.2). The first set is referred to as 'value chain actors'. These are the set of entrepreneurs that are at the center of the chain activity. They take risk of ownership of the particular commodity in question. In the case of rice they include the input sellers, farmers, paddy marketers, par-boilers, millers, milled rice marketers and consumers. The second group is called value chain supporters. They provide essential services needed for the successful business operation of the first group, but they do not take of control and owners of the commodity. The services include, but not restricted to, research and extension, financial, legal and administrative support. The third group is called value chain promoters, it comprises of all the constituents of an enabling environment that allows businesses to get established and flourish. They include the legal framework, social and capital infrastructure, political framework and financial support and safety-nets.

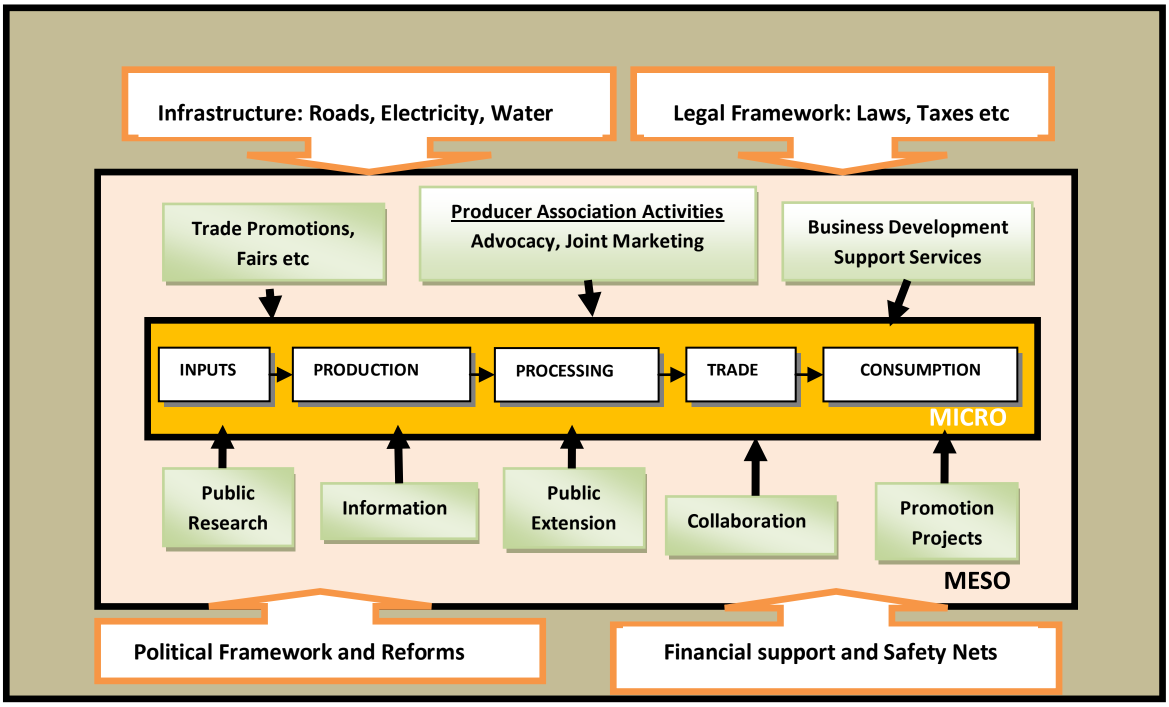


Figure 2.2:Value Chain Actors, Supporters and Promoters

Source: Adapted from Value Links (GTZ, 2009)

The activities are potential income generating opportunities. A more elaborate listing of potential employment and income generation opportunities is shown in Table 2.1. As the efficiency of the chain is improves, the demand for more and better services is created leading to more employment opportunities and income.

In the traditional product-oriented marketing system, farmers produce commodities for their own consumption and the surplus are "pushed" into the marketplace (Figure 2.3). In this system farmers are isolated from the consumer and as a result have little control over input costs or prices received for their goods. But under the value chain marketing system, farmers are linked to consumers' needs, and work closely with suppliers and processors to produce the specific goods consumers demand. Similarly, through flows of information and products, consumers are linked to the needs of farmers. Under this approach, and through continuous innovation, the returns to farmers can be increased and livelihoods enhanced.

According to Kaplinsky and Morris (2002), value chain refers to the full range of activities that are required to bring a product (or service) from conception, through the different phases of production, to delivery to final consumers and disposal after use. And a value chain is said to exist when all the stakeholders in the chain operate in the way to maximize the generation of value along the chain. There is a flow of information between actors and each is aware of the market demand (figure 2.3).

Table 2.1:Services that make up an enabling environment for agriculture

<table>
<tr><th>Basic infrastructure</th><th>Production and storage support</th><th>Marketing & business support</th></tr>
<tr><td>▪ Roads and transportation
▪ Communications
▪ Rural energy distribution
▪ Water and Irrigation access and regulation
▪ Products from Agricultural Research (genetic and production hardware plus information for efficient productivity)</td><td>▪ Production input supply merchants
▪ Farm machinery manufacturers and suppliers
▪ Extension services providing “Know-how and innovation” to producers
• Producer associations and cooperatives
• Weather forecasting
• Storage infrastructure</td><td>▪ Market information services
▪ Market intelligence
▪ Chambers of commerce
▪ Trader and Sector support groups
▪ Technical and business training services
▪ Local marketing centres
• Export promotion – trading houses</td></tr>
<tr><th>Financial support</th><th colspan="2">Policy reform, regulation, incentives and safety nets</th></tr>
<tr><td>▪ Credit services
▪ Banking services, note and electronic
▪ Crop / farm risk insurance schemes
▪ Trading exchanges
▪ Futures markets</td><td colspan="2">▪ Land tenure policy and taxation
▪ Government policy regulation for trading
▪ Safety net functions, such as food aid, price support schemes
▪ Investment grants
▪ Arbitration and reform councils based dialogue between private sector apex groups and Government select committees
▪ Legal reforms and dispute settlement
• Regional and international trade policy groups</td></tr>
</table>

Source: Adopted from Lundy *et-al* (2004)

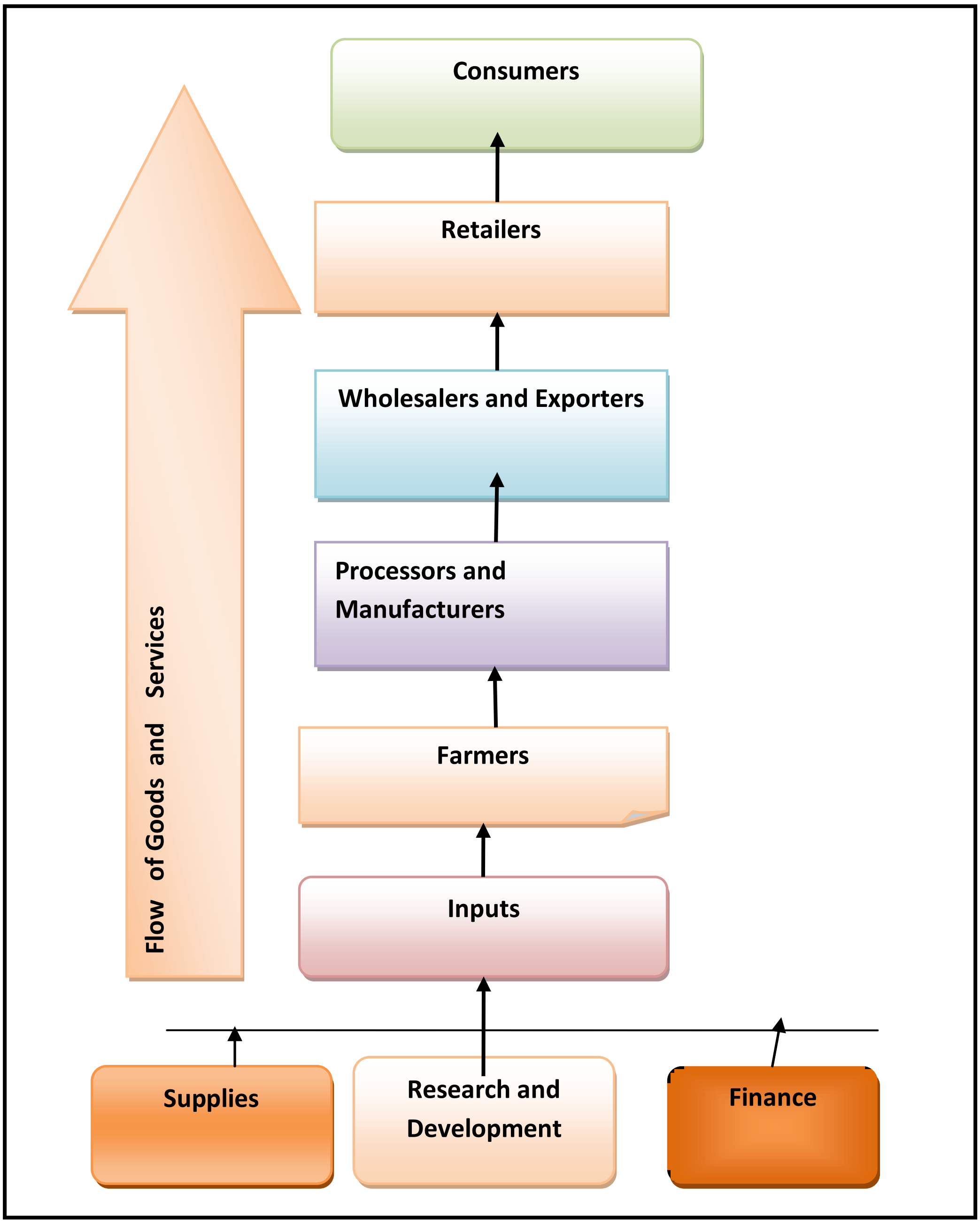


Figure 2.3: A typical Marketing Chain (Adopted from USAID, 2006)

Such information includes but not restricted to, product specifications, quality and standards and price. This is in contrast to the market chain where producers push surplus to the market, irrespective of the markets' needs (figure2.4).

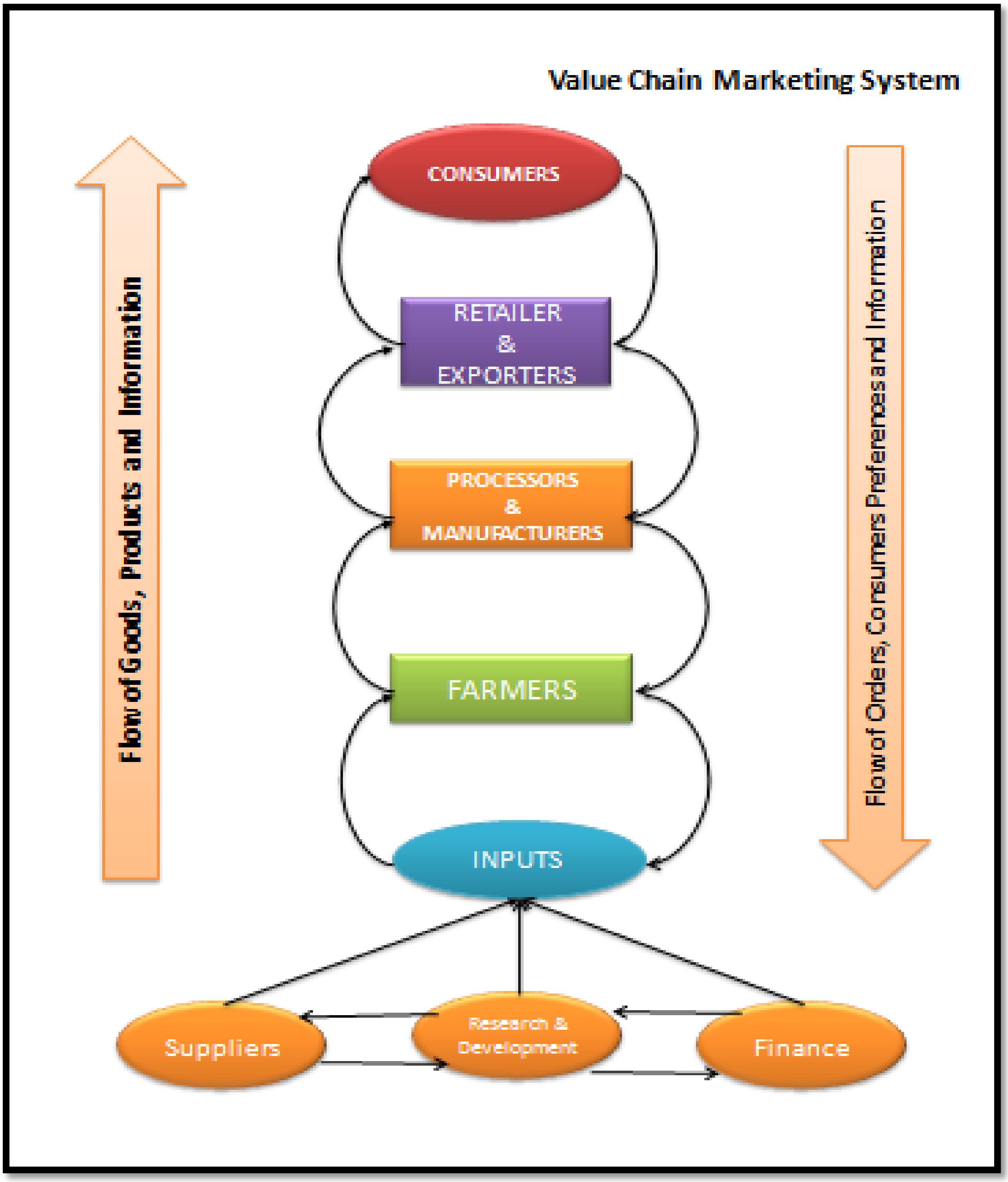


Figure 2.4: A typical Value Chain (Adopted from USAID, 2006)

2.3. Approaches and Theories of Value Chain Analysis

This section provides an overview of the theories and main research streams in value chain analysis. The theoretical foundation of value chain analysis, earlier on called Vertical integration, can be traced as far back as the 1920s, where the term "*Wirtschaftsformationen*" (economic formations) was used in German and Dutch geography to "describe the cooperation between agricultural production and the services that support it" (Stamm, 2004). The works of Hirschman (1958), particularly his *Strategy of Economic Development* and the "backward and forward linkages" described therein played an important role in laying the foundation for theoretical construct of value chain.

Since then several concepts that keep the chain element in focus have been developed. These include production chains, value chains, filière, marketing chains, supply chains, or distribution chains and a host of others. These concepts are so overlapping that a times it is impossible to draw clear distinctions between them (Webber and Labaste 2010). A number of them have had profound influence on shaping research orientation on value chain approach today. These include, but not restricted to, the French *filiere* approach in the 1960s, commodity chain after Wallerstein (1974), value chain after Porter (1980, 1985), Global commodity chain after Gerreffi, (1994), (1999) and Gerreffi et-al (2005), World economic triangle after Messner, (2002) and Global value chain after Humphrey and Schmitz (2000), Gereffi & Kaplinsky, (2001) and Gereffi et-al., (2005). Each is briefly described below.

2.3.1 The French filière approach

The early 1960s ushered in an era of independence for many European colonial territories, especially in Africa. This triggered discussion about vertical integration of production and distribution processes aimed at securing supply of essential raw material in Europe. The *"filière"(*"thread" or "Chain")*approach* was developed by French researchers at the Institute National de la Recherche Agronomique (INRA) and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) in the 1960s in response to that demand. It therefore started by studying contract farming and vertical integration in French agriculture. The *"filière"* concept, describes the flow of physical input and services in the production of a final product. The approach was later extended to the analysis of the agricultural system of developing countries under the French colonial system. The analysis mainly served as a tool to study the ways in which the agricultural production systems of rubber, cotton, coffee and cocoa were organized in the context of developing countries. Later this concept was applied to industrial policies.

The application of the *filière* approach to agriculture in developing countries was believed to be heavily influenced by the needs of the colonial and post-colonial French state, since state agricultural development policy in former French colonies was commodity-centred and required a matching framework. Thus *filière* analysis is applied overwhelmingly to agricultural commodities (Raikes et-al., 2000). The concept is often used as synonymous to commodity chain or subsector analysis. Kaplinsky and Morris (2002) noted that the "*Filière*" is used to describe the flow of physical inputs and services in the production of a final product, and is essentially similar to the modern value chain concept in its emphasis on vertical and horizontal coordination.

The *Filière* studies do not have a single unifying theoretical framework. The approach borrows from different theories and methodologies for their analyses. Despite the bewildering number of theoretical concepts used, a few general characteristics do emerge. *Filière* scholars generally avoid neo-classical analysis apart from the use of a few quantitative techniques. *Filière* analysis has until recently been concerned less about 'getting the prices right' than about 'getting public institutions right', institutions that were in charge of creating a smooth flow of commodities (Raikes et al.,2000). Much research has focused on local production systems and on how these are affected by public institutions. Over time, *filière* analysis focused more on how public institutions affect local production systems, and how "inter-professional associations" can help glue together direct and indirect economic actors, that is, those who handle the product of interest versus those who contribute ancillary goods or services (Webber and Labaste, 2010).

With the World Bank pressure for the liberalisation of the coffee, cocoa and cotton chains, the *filière* approach has been used to justify the maintenance of the *Caisses de Stabilisation* (stabilisation funds) during a period when most Anglophone countries have seen their equivalent structures (marketing boards) disappear. An empirical justification comes from the perceived negative consequences (among French research and academic circles) of market liberalisation in developing countries. At the same time, *filière* analysis has recently begun to deal more directly with issues of trade and marketing, so that it could discuss the workings of commodity chains within an increasingly liberalised context (Raikes et-al, 2000).

The '*filière'* approach includes various schools of thoughts and research traditions. But the two most outstanding ones are the effect method (*méthode des effects)* and the strategy focused analysis. The effect method is used to measure inputs and outputs flows, prices and value added along the chain, using an accountancy framework specific to French economics known as the *méthode des effects* (the 'effects method'). It is a variant of input-output analysis in which economic behaviour is taken as given, but in which non-price incentives are given greater attention (Raikes et-al, 2000). It focuses on income generation and distribution in the commodity chain, and disaggregates costs and incomes between local and internationally-traded components to analyse the spill-over of the chain on the national economy and its contribution to GDP (M4P, 2008).

The strategy-focused analysis of filière, especially used in the university of Paris-Nanterre, some research institutes e.g. CIRAD and INRA and NGOs e.g. IRAM working on agricultural development, researching in a systemic way the interplay of objectives, constraints and results of each type of stakeholders in the chain; individual and collective strategies are analysed, as well as patterns of regulations (M4P, 2008). The *"filière"* concept is a static model, with non-changing actors and national boundaries, as such it is less functional to analyse the globalized world economy (Stamm, 2004).

Although the *filière* approach has completely different epistemological roots, its results are similar, in many aspects, to the new *commodity* or *value chain* approaches. The approach, which was initially largely static, empirical and limited to national chain relationships, was further developed, at different times, through connections to various strands of theory. At some points, a convergence with Anglo-Saxon approaches can be observed. An important task of the *filière* instrument identified is: "to search out strategic junctures, from which the entire production and distribution chain can be dominated. The intention is to find those in the group of actors who not only determine their own action in the *filière*, but also thus powerfully influence the ability or even the need of other actors in the *filière* to act."

The *filière* is a value-free technique used in analyzing existing marketing chains for agricultural commodities. It consists of quantitative analysis of inputs and outputs, prices and value added along a given commodity chain using agent accounts (FAO 2005). In its general form, it includes functional, flow, technical, financial and economic analysis. The information obtained from the functional analysis can be summarized either in tabular form (Table 2.1) or in a commodity flow chart (figure 2.5).

Table 2.2: Functional analysis table

Stage of the Chain	Function	Agent	Output
Production	Cultivation Cultivation	Small farmers Large farmers	Rice paddy Rice paddy
Primary marketing	Marketing Transport to mill	Village traders Local traders Co-operative traders	Paddy delivered to private mills Paddy delivered to co-operative mills
Millers	Milling	Private millers Co-operative millers	Delivered to wholesalers - white rice, broken rice- to noodle industry Milled rice to animal feed industry Rice bran to exporters White rice, broken rice to retailers
Factories	Processing	Noodle Industry	Noodles to wholesalers Noodles to exporters
Marketing	Marketing Transport	Wholesalers - white rice Wholesalers - broken rice Wholesalers - noodles	Broken rice White rice Noodles

Source: FAO 2005

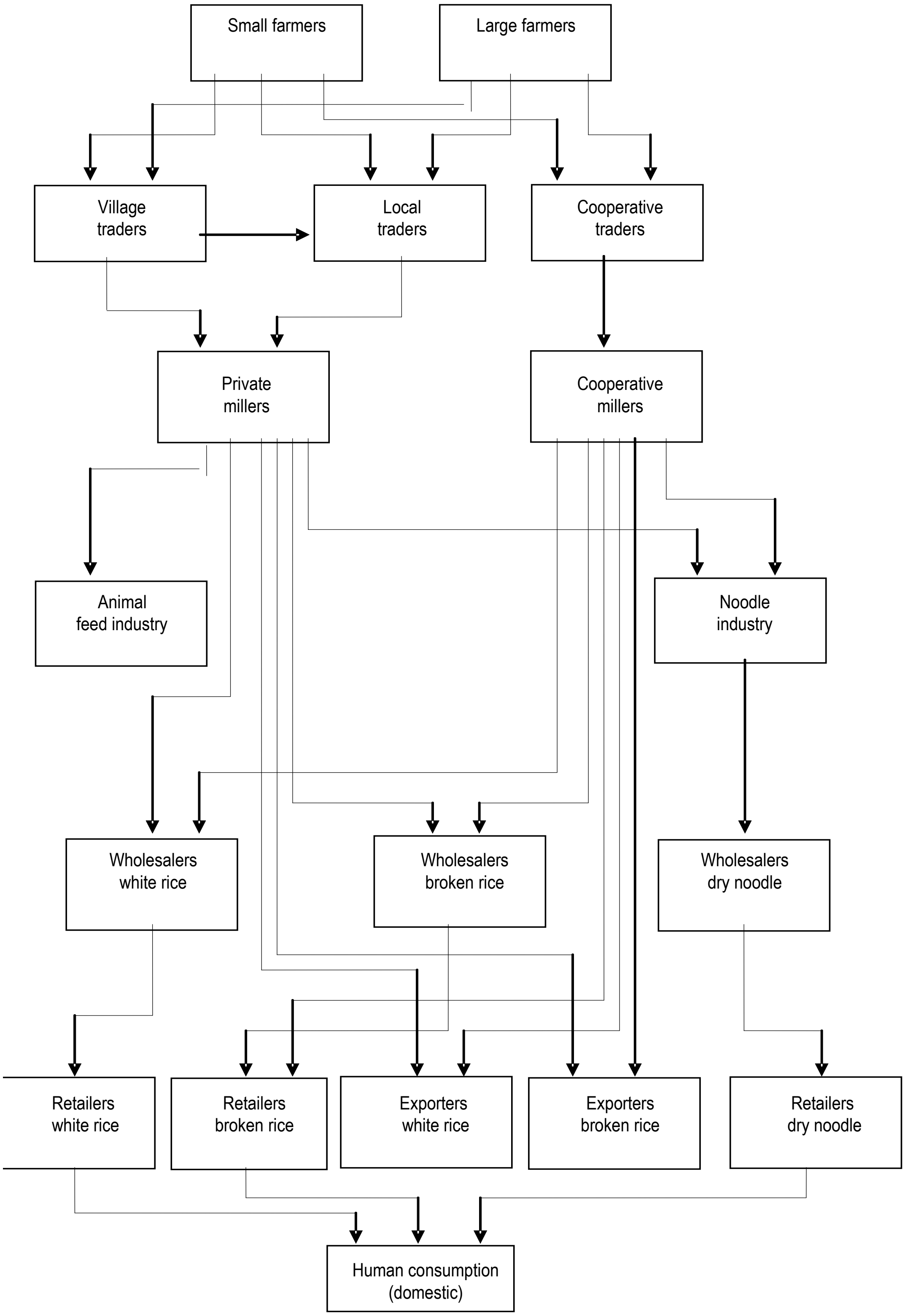


Figure 2.5: Commodity Flow Chart Format

Source FAO 2005

The financial analysis concentrates on estimating the value added by individual agents. For purpose of creating agents account the production inputs are classified into two groups intermediate and investment inputs:

- **Intermediate inputs** are those factors of production which are totally transformed and or consumed during the accounting period. These are variable inputs.
- **Investments goods** are those factors of production which are only partially used during the accounting period. They are the fixed assets.

The value added by an actor can be estimated via the following formula (FAO, 2005)

VA = Y – II

Where : VA = value added during the accounting period.

Y = the value of the output produced during the accounting period

II =the value of intermediate inputs used

This can be represented schematically (figure 2.6) by a simple chain of three agents.

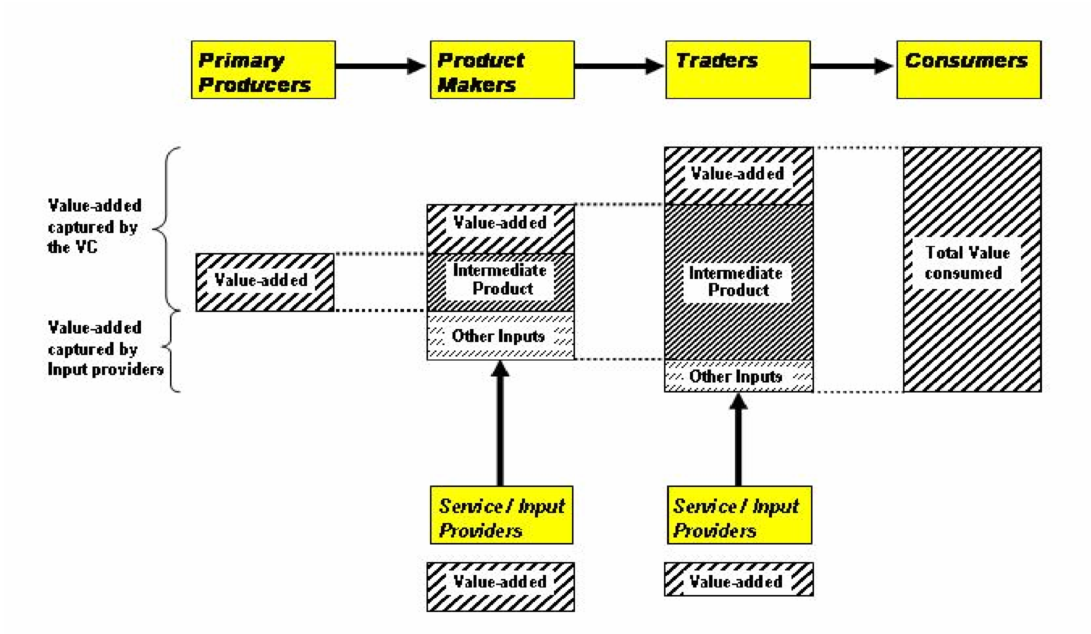


Figure 2.6: Principle of consolidation of Value added

Source: Adapted from GTZ, (2007)

2.3.2 Commodity Chain

In the 1970s, Wallerstein (1974) developed the concept of commodity chains. The concept was embedded in his world systems theory, which is an elaboration of the dependency theory. Wallerstein elaborated the world system theory in his seminal work *"The Modern World System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century"* published in 1974. The essence of World Systems Theory is that since 1800 human interaction – political, economic, and social – has occurred within a global economy – the capitalist system. States are not the containers of human politics, and they are anything but equal State interactions, as well as the interactions of numerous other political institutions occurring across a variety of geographic scales (i.e., the household, gender, class, race, nation, religion, and trans-national institutions such as the UN), are all processes occurring within the capitalist world economy.

The economy is the structure – everything else is ephemeral. Relationship exists between the "core" and "periphery" institutions. The institutions belonging to the "core" area produce high value goods that can be traded for surplus to "peripheral" institutions which produce cheaper, low value goods. The institutions can likened to countries and the core countries are the European countries while the peripheries are the underdeveloped countries. The peripheral countries produce raw materials, which are systematically and meticulously harnessed and transported to the core countries, where they are processed into high value goods and sold back at exorbitant prices. The setup creates an inherently unequal system of trade.

The GCC built upon the work of Wallerstein but highlighted the power of the state in shaping global production systems. The power is exercised in large part, in the form of tariffs and local content rules affected at the point where goods crossed borders. The term commodity chain was defined as ‘a network of labour and production processes whose end result is a finished commodity’. It is used to discuss a variety of international chains for agricultural (and timber) products, from the beginning of the early modern era. Hopkins and Wallerstein see all firms (and specific processes, referred to as ‘boxes’) as being involved in commodity chains as either producers of inputs to others, or users of inputs from others, chains forming the ‘warp and woof of the commodity system’ (Raikes *et al.,* 2000).

2.3.3 Porters Framework

The next research stream stems from the work of Michael Porter (1985) on competitive advantages. Porter's analysis of the competitive advantage stems from two fundamental questions. These are firstly, how attractive, from the viewpoint of long-term profitability, are different types of industry, and secondly what is an enterprises relative position in that industry? He bases his analysis on the twin concepts of value and competitive advantage. He argues that:"Competitive advantage grows fundamentally from the value a firm is able to create. Value is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset higher prices" (Porter, 1985). He continues: "A firm is profitable if the value it commands exceeds the costs involved in creating the product. Creating value for buyers that exceeds the cost of doing so is the goal of any generic strategy. Value instead of cost, must be used in analyzing competitive position “.

In this context, the concept of value chain is utilized as a conceptual framework that enterprises can use to detect their source (actual or potential) of competitive advantage. In particular, Porter argued that the sources of competitive advantage cannot be detected by looking at the firm as a whole. Rather, the firm should be disaggregated in a series of activities and competitive advantage found into one (or more) of such activities. Porter distinguishes between primary activities, which directly contribute to add value to the production of the good (or services) and support activities, which instead have an indirect effect on the final value of the product (figure 2.7).

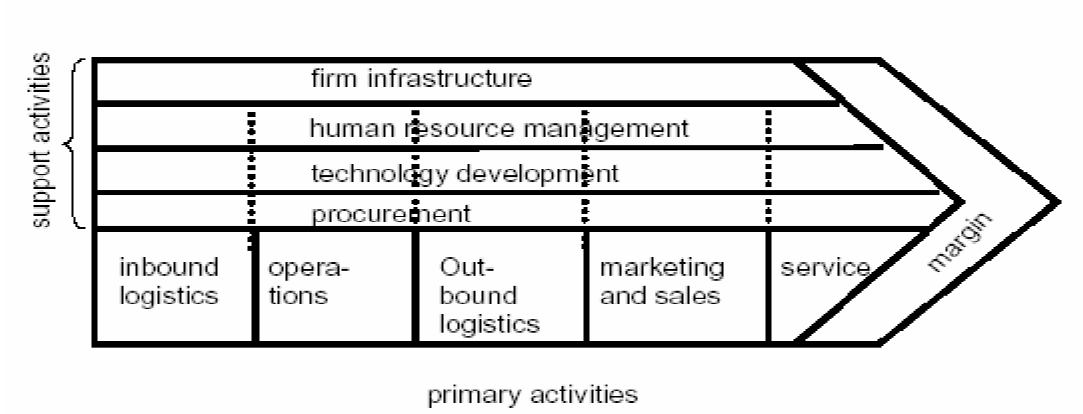


Figure 2.7: Porter's Framework (Porter, 1985)

In Porter's framework, the concept of value chain is not restricted to the idea of physical transformation, as firm's competitiveness does not exclusively relate to the production process. Enterprise competitiveness can be analyzed by looking at the value chain which includes product design, input procurement, logistics, outbound logistics, marketing, sales, after-sale and support services such as strategic planning, the management of human resources management, research activities, etc. Thus the concept of value chain has therefore a strict business application. Consequently, value chain analysis mainly aims at supporting management decision and executive strategies at the firm level. Porter pointed out that competitive advantages can be created by reconfiguring the chain in order to achieve *lower costs* or performing a better differentiation than competitors do. He identified ten cost drivers for enterprise chains as:

i. Economies of Scale
ii. Learning
iii. Capacity Utilization
iv. Linkages among activities
v. Interrelationships among business units
vi. Degree of vertical integration
vii. Company's policy of cost or differentiation
viii. Timing of market entry
ix. Institutional factors (regulations, taxes,.)
x. Geographic location

Drivers of uniqueness (required for competitive advantages through differentiation) recognized by Porter are:

i. Policies and decisions
ii. Linkages among activities
iii. Scale
iv. Timing
v. Location
vi. Interrelationships
vii. Learning
viii. Integration
ix. Institutional factors

An alternative way of approaching the search of competitive advantage is based on the concept of a 'value system' (figure 2.8). The value system approach moves a step further, instead of limiting the analysis of competitive advantage to a single firm, the firms activities can be viewed as a part of a larger stream of activities, which Porter terms 'the value system'. A value system includes the activities implemented by all the firms involved in the production of a good or service, starting from basic row materials to those engaged in the delivery to the final consumers.

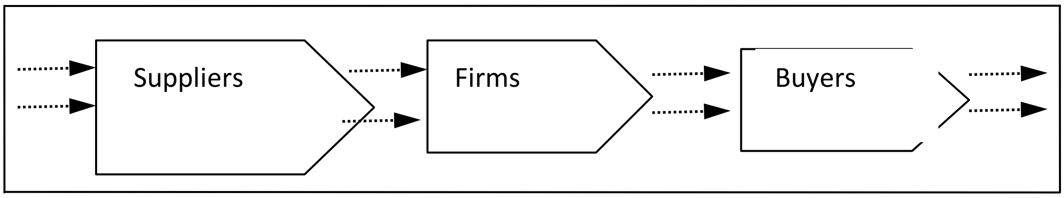


Figure 2.8: The value system

It is worth noting that in Porter's framework, the concept of value system is mostly a tool for assisting executive management in strategic decisions. Another problem with Porter's terminology is that it seems not to distinguish between 'competitive advantage' of the dominant key agent and of those subordinated to it. All but one of the 'higher order factors' seem likely to be retained by the key agent, while the one remaining (industrial upgrading) can occur only at its will and on its premises (Raikes et-al, 2000). Even though Porter's framework was directed at the firms' decision making the level, there are strong indications suggesting that the concept has had great influence on value chain research.

2.3.4 Global Commodity Chain (GCC) Approach

The Global Commodity Chain analysis has been developed primarily for industrial commodity chains. These chains are seen to have been globalised at a specific point somewhere between 1960 and 1980, and to be related to various processes normally discussed under the rubrics of globalisation and/or 'post-Fordism' (Raikes et-al, 2000). The beginning of GCC analysis as a relatively coherent paradigm can be traced to a collection edited by Gereffi and Korzeniewicz (1994). Although the book starts with the discussion of the grain trade in sixteenth century Europe, Gereffi and his collaborators are concerned specifically with industrial commodity chains. They focus on the emergence of a global manufacturing system in which economic integration goes beyond international trade in raw materials and final products, to encompass centrally-coordinated but internationally-dispersed production of many of the activities along the chains of given commodities or manufactured products (Raikes et-al, 2000).

Kaplinsky and Morris (2001) observed that in the course of globalization, there has been a perception (in most of the cases well-justified) that the gap in incomes within and between countries has increased. They argue that value chain analysis can help to explain this process, particularly in a dynamic perspective. The GCC approach identifies four major dimensions of global commodity chain analysis. These are the input-output structure, the territory, the governance structure and the institutional framework. The input-output structure and the geographical coverage of GCCs are used to describe and outline the configuration of specific chains. The *governance structure* examines the barriers to entry, the chain co-ordination and its power structure. The *institutional framework* is used to delineate the conditions under which key (or 'lead') agents incorporate subordinate agents through their control of market access and of information (both technological and regarding markets). Furthermore, the institutional framework is used to discuss how subordinate participation in a GCC can provide indirect access to markets at lower costs than individual small-scale producers would face, and how technological information and learning-by-doing can allow (the more favoured) producers to move up the chain hierarchy (Raikes et-al.,2000).

A major criticism of the GCC approach is its lack of quantitative analysis which is linked to the use of loose definitions of concepts and functional assumptions. Key parts of the analysis, such as the location of profits within a chain, are done mostly at an abstract level. GCC analysts seldom demonstrate that the profits are higher in some parts of the chains than in others by providing quantitative evidence. This is in contrast to its key rival approach the filiere which is grounded on quantitative techniques. The quantitative tradition reflects a key characteristic of French economics *vis à vis* Anglo-Saxon tradition. In France, economics was a science of accountancy and not of behaviour (Raikes et-al., 2000). Despite the identified shortcomings, of the GCC approach, it is considered to have more potential for the study of global commodity chain because of its focus on the full length of global chains, while the *filière* tradition mostly focuses on local or national levels of the chain.

2.3.5 World economic triangle

Based on Gereffi's GCC, Messner (2002) developed the world economic triangle. The GCC approach identifies four major areas of emphasis in value chain research; input-output, institutional, geographic and the governance structure. Out these four areas, governance structure appeared to have received the highest attention. The approach was challenged, by both proponents and opponents, for failing to provide convincing explanation on some of the empirical issues encountered in the field. Messner's concept of world economic triangle is based on the assumption that actors, governance and regulation systems determine the scope of action in the global commodity chains. The approach focuses on upgrading entire regions or clusters through their integration into chains. The approach puts emphasis on the horizontal perspective of the value chain. The horizontal (cluster development) and vertical approaches (value chain) are linked (Kaplinsky and Morris 2002). The "Triangle" is influenced by six governance aspects: actor constellations, interests, power structures, situational mindsets, action orientation and trust. Global standards as a regulatory system aim to reduce transaction costs by improving trust between chain elements (*Messner, 2002).*

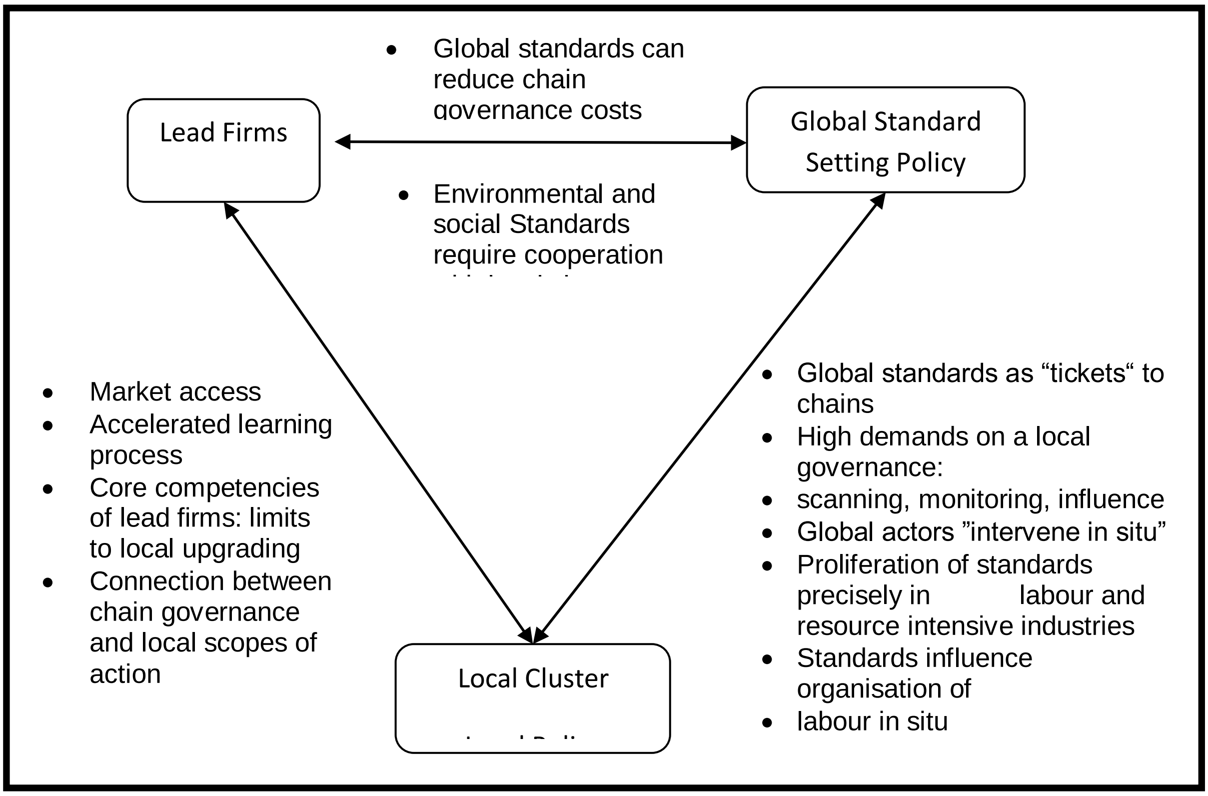


Figure 2.9: World Economic Triangle

Source: Messner, (2002).

2.3.6 Global value chain

In the early 2000 the concept of "Global Value Chain" was introduced. The concept evolved from its most direct progenitor, the "global commodity chains" (GCC) framework developed by Gereffi (1994, 1999). The GCC framework contributed in explaining the role played by the new set of actors, in driving capability development, especially in East Asia. The "buyer-driven" variant, on one hand focused attention on the powerful role that large retailers, such as JC Penny, Sears, Wal-Mart, as well as highly successful branded merchandisers, such as Nike and Liz Claiborne, played in the governance of global production and distribution. The "producer-driven" variant on the other hand, was dominated by large manufacturing firms such as General Motors and IBM. The producer-driven chains have more linkages between affiliates of multinational firms, while buyer-driven chains have more linkages between legally independent firms.

However, despite the significant contribution of the GCC framework, recent development called for a better theoretical framework that will help provide sufficient explanation of the observed changes over the last decades. Some of the observation include: outsourcing of activities and developing strategic alliances with competitors by the transnational giants. They have become less vertically integrated and more network-oriented. The buyer and producer-driven GCC typology was based on a static, empirically situated view of technology and barriers to entry, but both are dynamic because of technological change and firm and industry-level learning (Henderson et al, 2002; Ponte and Gibbon, 2005). Better global standards in the realms of business processes and product characteristics, and the heavy application of information technology in areas such as design, manufacturing, service provision, supply-chain coordination, and materials management, has enabled increased outsourcing in producer-driven chains and made it possible, and more compelling, for firms to forge modular linkages between buyers and suppliers in both producer- and buyer-driven chains.

In 2000, a group of academic researchers with deep experience in field-based observation of cross-border production in a range of industries met in series of workshops to develop a theory of governance for what was eventually called 'global value chains' (GVCs) (Sturgeon, 2007). The goal was to create a relatively simple theoretical model that was robust, relevant, and easily applicable to real-world situations. And to set a virtuous cycle in motion where a growing, relatively coherent body of scholarly research would build academic legitimacy that would in turn embolden practitioners to apply non-standard concepts in the field to help solve real-world policy problems.

Four new features in the governance of global-scale economic activity that stimulated the re-conceptualization of the key variables in cross-border chain governance were perceived (Sturgeon, 2007):

- Improvements in information technology and industry-level standards that enable the codification of complex information, which were easing the way for network forms of organization in technology-intensive industries.
- Flexible capital equipment that was enabling technology- and capital-intensive
- production equipment to be pooled in the same way that labour intensive production can be pooled, again easing the way for network forms of organization in technology-intensive industries.
- Sophisticated supply-chain management tools that were pushing labour-intensive industries up the technology curve.

- Increased outsourcing by manufacturing firms, and increased involvement in product definition by retailers (private label) were blurring any clear distinction between buyers and producers.

Sturgeon (2007) reported that the term “commodity” was replaced with term “value” because of the popular connotations of the word “commodity” with undifferentiated products, especially primary products such as crude oil and bulk agricultural goods, and because the term “value” captured both the concept of “value added,” which fit well with the chain metaphor, and focused attention on the main source of economic development: the application of human effort, often amplified by machines, to generate returns on invested capital. The other major important outcome of the GVC Initiative is the identification five different governance patterns of the GVCs (Gereffi *et al.,* 2005):

i. ***Markets:*** Markets are the simplest form of GVC governance. GVCs governed by markets contain firms and individuals that buy and sell products to one another with little interaction beyond exchanging goods and services for money. The central governance mechanism is price. The linkages between value chain activities are not very "thick" because the information that needs to be exchanged and knowledge that needs to be shared is relatively straightforward.

ii. ***Modular value chains.*** This is the most market-like of three network-style GVC governance patterns. Typically, suppliers in modular value chains make products or provide services to a customer's specifications. Suppliers in modular value chains tend to take full responsibility for process technology and often use generic machinery that spreads investments across a wide customer base. This keeps switching costs low and limits transaction-specific investments, even though buyer-supplier interactions can be very complex. Linkages are necessarily thicker than in simple markets because of the high volume of information flowing across the inter-firm link, but at the same time codification schemes and the internalization of coherent realms of knowledge in value chain "modules," such as design or production, can keep interactions between value chain partners from becoming highly dense and idiosyncratic.

iii. ***Relational value chains.*** In this network-style GVC governance pattern we see mutual dependence regulated through reputation, social and spatial proximity, family and ethnic ties, and the like. The most obvious examples of such networks are in specific communities, or "industrial districts," but trust and reputational effects can operate in spatially dispersed networks as well. Since trust and mutual dependence in relational GVCs take a long time to build up, and since the effects of spatial and social proximity are, by definition, limited to a relatively small set of co-located firms, the costs of switching to new partners tends to be high. Dense interactions and knowledge sharing are supported by the deep understanding value chain partners have of one another, but unlike the codification schemes that enable modular networks, these "short-cuts" tend to be idiosyncratic and thus difficult and time-consuming to re-establish with new value chain partners.

iv. ***Captive value chains.*** In this network-style GVC governance pattern, small suppliers tend to be dependent on larger, dominant buyers. Depending on a dominant lead firm raises switching costs for suppliers, which are "captive." Such networks are frequently characterized by a high degree of monitoring and control by the lead firm. The asymmetric power relationships in captive networks force suppliers to link to their customer in ways that are specified by, and often specific to a particular customer, leading to thick, idiosyncratic linkages and high switching costs all round.

v. ***Hierarchy.*** This governance pattern is characterized by vertical integration (i.e. transactions take place inside a single firm). The dominant form of governance is managerial control.

The GVC Initiative (Gereffi et al, (2005)) further identified three important variables to look for when studying GVCs in a particular firm, industry, or place:

i. ***The complexity of transactions.*** More complex transactions require greater interaction among actors in GVCs and thus stronger forms of governance than simple price-based markets. Thus, complex transactions will likely to be associated with one of the three network governance patterns (modular, relational, or captive) or integrated within a single firm (hierarchy).

ii. ***The codifiability of transactions.*** In some industries schemes have been worked out to codify complex information in a manner in which data can be handed off between GVC partners with relative ease, often using advanced information technologies. If suppliers have the competence to receive and act upon such codified information, and if the codification schemes are widely known and widely used, then we would expect to see modular value chains emerge. If not, then lead firms might either keep the function in-house, leading to more vertical integration (hierarchy) or outsource it to a supplier that they tightly control and monitor (the captive network type) or have a dense, idiosyncratic relationship with suppliers (the relational governance type).

iii. ***The competence of suppliers.*** The ability to receive and act upon complex information or instructions from lead firms requires a high degree of competence on the part of suppliers. Only then can the transfer of complex but codified information be achieved (as in modular networks) or intense interaction be worthwhile (as in relational networks). Where competent suppliers do not exist, lead firms either must internalize the function (hierarchy) or outsource it to suppliers that they tightly monitor and control (captive suppliers).

Furthermore, if one of these three variables changes, then value chain governance patterns tend to change in predictable ways. For example, if a new technology renders an established codification scheme obsolete, we might expect modular value chains to become more relational, and if competent suppliers cannot be found, then perhaps captive networks and even vertical integration would become more prevalent. Conversely, rising supplier competence might mean that captive networks move toward the relational type and better codification schemes might prepare the ground for modular networks.

The result has been broad and rapid shifts in chain governance, where producers have become more buyer-like through outsourcing, and where the capabilities required to serve global buyers have been escalating rapidly. Today, global-scale networks of legally independent firms no longer make only simple items, but technology- and capital-intensive goods and services as well. The GVC framework specifies a more elaborate set of governance forms and crucially provides a method to explain changes in governance patterns over time. In general the buyer-driven chains tend to be coordinated via market, modular, or relational governance, while producer-driven chains tend to be coordinated via captive or hierarchical governance (Table 2.3).

Key Variable	**Complexity of Interactions**	**Ability to Codify Instructions**	**Capability in the Supply-Base**	**Degree of explicit coordination and power asymmetry**
Governance type				
Markets	⇩	⇧	⇧	Low
Modular	⇕			

Relational	⇩	⇩	⇩	
Captive	⇩	⇧	⇧	
Hierarchy	⇧	⇧	⇧	

Table 2.3: GVC governance structure and mode of coordination

Adopted from: Gereffi et al (2005)

2.4 Using Market Power to Reduce Rural Poverty

Increasing globalization is changing the business environment of Small and Medium Enterprises (SMEs) and agricultural producers in developing countries in different ways. Altenburg (2007) described some of the developments that impact on the structure of value chains as a result of this development as:

- Liberalization of global markets increases competitive pressure and enhances the role of economies of scale.
- Increased international competition reduces returns to firms that fail to innovate and distinguish their product.
- International competition also rewards reliable and timely delivery. Error-free production, smooth supply chain logistics and short time-to-market thus become increasingly important for the success of companies.
- Greater consumer awareness has given rise to higher and more differentiated consumer standards.
- New transportation, information, and communication technologies have driven down the cost of accessing information and trading products and facilitate the spatial division of value chains.
- Some firms increasingly dominate their business partners upstream and downstream in the value chain, imposing their own rules and acting as gatekeepers to the market.

- Their dominance arises from specific capabilities, mostly the capabilities to innovate, to create brands, or to coordinate the whole production process. Their privileged position implies a shift in power that translates into increasing rents.

These and other similar issues makes it is clear that strategies aiming to reduce rural poverty need to move beyond a focus on productivity to include the many other aspects involved in being part of a competitive marketing chain. Gaining a better understanding of demand and profitability is crucial if farmers are to avoid the problems of all trying to supply the same markets, with little attention to quality, as this will only lead to a poverty treadmill of producing more for lower prices. To engage in the marketplace effectively, farmers need to develop new skills and have support from service providers who have a far better understanding of the marketplace, at the local, national or international level.

Basing poverty reduction approaches on increasing production has shown itself to be only partially effective. Farmers can no longer simply expect to be offered a reasonable price for increased supply of goods. The plight of the coffee farmers around the world shows that when supply consistently outstrips demand by only 3-4 percent that prices do not fall by 3-4 percent, they can fall by more than 60 percent, i.e., to the lowest offer price (Lundy *et al.,* 2003). Other actors in the market chain will use their competitive advantage to exploit this lack of marketing know-how.

Farmers, today more than ever before, need to learn not only how to produce but first how to identify profitable market opportunities, how to adapt and improve their produce and to work with others in a market chain to meet the increasing demands of the ever more globalized consumer. This new breed of consumer is seeking more choice, better quality, consistent year-round supply, greater assurance of safe production methods and as markets mature, is seeking all of these factors at lower prices. Understanding profitability, competitiveness and being attuned to changing market signals helps in making business decisions.

While entrepreneurs invest in private interests, development agencies should invest in matters of public interest, such as improving access to commercial activities, promoting fair-trade schemes, small entrepreneur capacity building, labour standards, corporate social responsibility, etc. Public interventions in markets inevitably lead to changes in the existing markets. Where no market for a specific product exists, or an existing market is monopolised by a single company, the creation of a market, or the removal of a distortion can nevertheless be the objective of a development intervention.

2.5 Rice as Pro-Poor Crop

The major objectives of improving the value chain for the poor are twofold: First is to increase the total amount and value of product that the poor sell in the value chain. This results in higher absolute income for the poor, as well as, for the other actors in the chain. Secondly is to sustain the share of the poor in the sector or increase the margin per product, so that the poor do not only gain absolute income but also relative income compared to other actors in the chain (M4P, 2008). In order to achieve these dual objectives the commodity to be used has to be selected carefully. Some of the questions to be considered in the choice of value chain include but not restricted to; which are the priority value chains? Which ones should be supported? Why does comparative advantage matter, and how can it be assessed? How should public, private, and collective perspectives and interests be harnessed? In trying to answer these questions a number of issues are taken into consideration as suggested by Webber and Labaste (2010):

- First, high consideration is given to government prioritized development subsector that is considered vital to the country, had high value added, or were import substitutes.
- Secondly, subsectors with extensive economic impact on the country are examined.
- Finally, subsectors that were of interest to private enterprise or that had a high likelihood of attracting private domestic and foreign direct investment are carefully looked at.

Rice, being the most important staple food for the world poorest people, has satisfied the conditions as a pro-poor crop (NRDS, 2009). Although rice is predominantly a crop for Asia, where most of the poor live, it is becoming increasingly popular in sub Saharan Africa, especially Nigeria, where the proportion of the poor is truly alarming. With total annual production of about 2 million metric tons, rice is the fourth largest cereal crop grown in Nigeria behind sorghum, millet and maize. Rice is listed as the second most important food security crop in Nigeria. It is important both for consumption and as a source of revenue for small farmers in rural areas. Eighty percent of the rice crop is marketed, and it generates the largest contribution to rice producer household income, allowing the household to purchase other foods. Nigeria is not only Africa's leading consumer of rice; it is also one of its largest producers and the second largest importer in the world. Rice is an extremely important food and cash crop in Nigeria. The total rice industry, imports and domestic production, is valued at about $5 billion. Estimates indicate that over 90 percent of domestic rice production comes from resource-poor and weakly organized smallholders (USAID, 2009).

With total annual rice production at about 2 million metric tons (MT), and imports of about 3 million MT of rice, the total national consumption exceeds 5 million MT per year, or more than 30 kg per capita per annum. Rice is rapidly becoming the preferred staple food in the urban areas where annual consumption exceeds 47 kg/capita. Considering that total sales of rice exceed $5 billion per year, $3 billion of which are from imports (USAID, 2009), there is a significant rice market in Nigeria and the value chain is worth exploring.

2.6 Value Chain and Poverty Reduction

Pro-poor growth (PPG) is the most commonly quoted objective of value chain promotion. Two concept of the PPG, relative and an absolute are identified. The relative concept states that economic growth is pro-poor if poor people increase their incomes above the poverty line, even if their share in the national income does not improve (a positive growth rate for poor). The absolute concept states that growth is pro-poor, when the income of the poorest (e.g. of the lowest quintile in a population) increases at least equally or more than the average income (such that inequality is reduced). PPG stresses the need to make the poor participate directly in the economic growth, not to rely on social transfers (M4P 2008, GTZ 2007)

It is generally agreed that economic growth is a necessary, but not, sufficient precondition for poverty reduction. For economic growth to lead to poverty reduction, the strategies must include areas which the poor have comparative advantage such as agriculture. Most strategies that seek rapid industrialization at the expense of agriculture, even if the intent is to alleviate poverty, actually slow down economic growth and increased levels of poverty (Timmer, 2005). Hafiz (2002) observed that for a sustained poverty reduction, growth should employ strategy that directs resources disproportionately to sectors in which the poor work (such as agriculture), areas in which they live (rural areas), factors of production which they possess (such as unskilled labour) and outputs which they consume (such as food).

The proponents of market development approaches, such as Making Markets work for the Poor (M4P), value chain development or industrial strategy, argue that poverty can only be reduced sustainably through improvement of the market systems within which poor people live. Markets are the main means through which people participate in economic activity. It was agued further that where markets operate in an inclusive manner, they serve the poor by offering them the means – jobs opportunities, finance and products – to increase their incomes (DFID, 2004).

The Millennium Development Goals (MDGs), especially the first goal which set "the target of reducing the incidence of absolute poverty by half by the year 2015", appeared to have provided an additional impetus for the emergence of different strategies, especially market oriented, for fighting poverty. Klasen (2007) defined pro-poor growth as growth that maximizes the income gains of the poor and thus accelerates progress toward meeting MDG1. The incidence of poverty was linked to the failure of the market, as the effective operation of markets plays an important growth enhancing role by creating incentives for investment, trade and resources allocation within the economy. This resulted in an upsurge of interest in market development approaches amongst aid agencies, donors and governments. Alongside M4P there is the United Nations Development Project (UNDP) Growing Inclusive Markets, the Inter-American Development Bank (IADB) Opportunities for the Majority and the World Bank Group International Finance Corporation (IFC) Next Four Billion. Amongst businesses, there is growing interest in social investment, sustainable business practices, fair trade and engaging with the Base of the (Economic) Pyramid (BoP). Although terminology and emphasis may differ, all of these approaches see a market-based economic engagement with the poor as essential for sustainable development (IFPRI, 2008).

One of the guiding hypotheses of the value chain approach is that adding value to export and domestic commodities generates substantial profits and employment along the chains, and hence contributes to poverty alleviation. The promotion of value chains in agribusiness aims to improve the competitiveness of agriculture in national and international markets and to generate greater value added within the country or region. The key criterion in this context is broad impact, i.e. growth that benefits the rural poor to the greatest possible extent or, at least, does not worsen their position relative to other demographic groups (GTZ, 2007).

United Nations Industrial Development Organization (UNIDO, 2009) reported that value chain analysis is a useful analytical tool that helps understand overall trends of industrial reorganization and identify change agents and leverage points for policy and technical interventions. It is increasingly used by donors and development assistance agencies to better target their support and investments in various areas such as trade capacity, enterprise competitiveness, income distribution and equity among value chain participants. Poverty includes more dimensions than incomes alone. The five interactive core-dimensions of poverty identified by OECD (quoted in Vellema, 2010) are worth noting:

i. **Economic capabilities**

Ability to earn an income, to consume, to have assets, and to secure access to productive financial and physical resources

ii. **Protective capabilities**

Ability to withstand economic and external shocks, to cope with insecurity and vulnerability and to respond to seasonal variations

iii. **Political capabilities**

Ability to have a voice and some influence over public policies and political priorities

iv. **Socio-cultural capabilities**

Ability to participate, as a valued member of a community, and to put an end to geographic and social isolation

v. **Human capabilities**

Ability to ensure well-being, i.e. health, education, nutrition, clean water and shelter, and to improve livelihoods

The overall context for pro-poor development is shaped largely by a number of trend and developments at the macro-economic level. Such developments include, but not restricted to; globalization, liberalization of markets for agricultural products, deregulation of public services, legislation and regulation on food safety and quality and international competition. International agreements, intergovernmental negotiations and global market forces are the major drivers of developments and changes at this level and, accordingly, they shape conditions for actions and interventions in value chains. Obviously, value chains are part of this dynamic market and regulatory environment in which the chain partners together constitute an important institutional arena for making market economic development instrumental in poverty alleviation (Vellema, 2010).

Markets are important for pro-poor development and poverty alleviation. The livelihoods of most of the poor people depend directly on their involvement in markets, either as producers, workers or consumers. Historically, the major successes in poverty reduction have been associated with the growth of markets and the private economy. In the 1950s and 1960s when agricultural export was the major source of income for Nigeria, poverty level was below 10 percent (NBS, 2012). This was related to farmer's access to international markets and its attendant growth. When the condition changed, farmers were confronted with major challenges, which include lack of access to the markets and the effects of price volatility of inputs markets on their livelihoods. This shows the valuable role markets play in promoting and facilitating economic efficiency through exchange and the coordination of many different kinds of resources, goods and services.

Poor farmers are typically the weakest link in market chains on both the production and consumption side. They are the least able to take advantage of new market opportunities and the most vulnerable to the rapidly changing market environment. Irrespective of the success achieved in improving production practices and productivity, the terms with which they engage in markets represent a constraint. Two ways in which agricultural markets can be used to help poor households meet the objectives of higher income and greater income stability have been identified (Lundy et-al, 2004). First, poor farmers can move from low to high value market chains. Second, they can increase their share of benefits in existing chains. This implies that small scale farmers have to create value in order to capture benefits in markets. Because no downstream market actor would be willing to pay more for the same thing that they now buy at a low price.

A value chain approach to economic development and poverty reduction involves addressing numerous and multifaceted constraints and opportunities faced by farmers and or producers, processors, traders and other businesses at multiple levels and points along a given value chain. This will include a wide range of activities, such as ensuring access to the full range of necessary inputs, strengthening the delivery of business and financial services, enabling the flow of information and facilitating improved market access.Kaplinsky and Morris (2001) noted that due to the high incidence of poverty in the agricultural sector, the value chain framework can be used to draw conclusions on the participation of the poor and the potential impact of value chain development on poverty reduction.

2.7 Review of Value Chain Empirical Studies

Value chain analysis has received tremendous attention, over the last decade, by various researchers from different disciplines which include but not restricted to; sociologist, economist, geographers, business management specialist, and environmentalist. Fabe *et-al* (2009), estimated that the number of publications using any term related to 'value chain' in the title, abstract or key-word' increased from 140 publications in 1995 to over 3,500 in 2007. The review in this section is limited to empirical studies on rice value chain in Nigeria and other places and studies related to rice in Nigeria and the study area.

Agrifood Consulting International (2006) analyzed the rice value chain in Dien Bien province, Vietnam. The value chain approach was used to analyze the behaviour of each major participant (producers, processors, traders, exporters) in the system that links production to final consumption and a detailed account of the constraints faced by the participants. The relations among different participants in the sector, in turn, helps in explaining the means by which benefits are distributed within the chain and influence the way different actors try to improve their positions within the chain. The study found that although about 80 percent of the rice grown is consumed within the province, there was an active rice trade. It was found that majority of the farmers grow some quantity of the higher valued rice, usually aromatic 'Upland Sticky Rice' which they sell rather than self-consume. The income received is used to purchase a higher volume of less valuable rice. As such the combination of famers selling of high value rice and their purchases of higher quantity of low value rice gave rise to the active rice trade in the area. Chanerin (2011) studied value chain of rice exported from Thailand to Sweden. The study examined the entire chain of rice from farm in Thailand to consumers in Sweden. Secondary data was used for the entire study. Results of the study revealed that there were at least twelve actors in the value chain which include farmers, local collectors, farmer's organization, central market, millers, brokers, wholesalers, retailers, exporters, International rice traders and brokers, Associated Marketing Services (AMS), Swedish importers and Swedish consumers. Profits were shared largely to stakeholders who have higher bargaining power which are millers and exporters.

Earlier rice studies in Nigeria concentrated on comparative advantage and general production surveys. Onyenwaku (1980) used linear programming method as the analytical approach in his comparative advantage studies. He concluded that the northern states in Nigeria had comparative advantage over the southern states in the production of most of the grains. The north was also found to account for nearly 98 percent of the land needed to satisfy national demand for the five grains studied (sorghum, millet, maize, rice and cowpea). The World Bank (1995) found that Nigeria had comparative advantage not only in the traditional export commodities (cocoa, rubber and palm produce) but also in the production of grains, including rice. Akande (2003), studied inter-regional competitiveness in the production of food grains, including rice in Nigeria. He observed that, given the economic environment and factor cost relationships prevailing in Nigeria in the early 1990s, Nigeria had comparative advantage in the production of rice.

Longtau (2003) undertook a general rice production study in Nigeria for the Overseas Development Institute (ODI) Multi-agency partnerships for Technical change in West African agriculture (MAPS). He found very low levels of use of modern inputs, which was attributed to the observed institutional failure of the formal extension system that left small scale farmers at the mercy of poorly developed farmers' associations, non-governmental organizations (NGOs) and community based organizations (CBOs). It was also observed that there was absence of action-research on rice–fish culture and other innovative technologies that could add value to rice production. An absence of descriptions of the diverse low-input rice production techniques found in Nigeria that could be disseminated more widely. Lastly there was a near-total collapse of large- and medium-scale rice schemes. Chuma (2004) examined the impact of trade on domestic rice production and the challenge of self-sufficiency in Nigeria, with a survey data collected between 2001 and 2003. He pointed out that Nigeria is currently the largest rice importer in the world. Hitherto, Indonesia had until 2004 been the world's largest importer of rice. Today Indonesia has with a sense of patriotism surpassed all odds to become self-sufficient in the commodity. Nigeria still imports about 2 to 3 million tons of rice. The results indicated that the market for domestic rice has been shrinking due to rice imports and marginal costs were found to increase with increase in transport costs. He concluded that improving the standards of local rice is feasible and desirable, but it may not be competitive for local rice mills, unless production costs are reduced significantly at the farm level.

The International Center for Soil Fertility and Agricultural Development IFDC (2008) studied rice value chain in the Niger basin of Mali, Niger and Nigeria. The study in Nigeria used Rice Box (R-Box) to estimate the cost of production of rice. It applied the following yield estimates; 1.46, 1.08, 0.54 tons per hectare for irrigated, lowland rain-fed and upland rain-fed rice respectively to estimate the revenue. The study found that majority (95%) of rice farmers operate on small scale farms of 0.5 to 1.5 hectares. Yields were low due to low seed quality, low fertilizer use, limited area in irrigation, and use of traditional cultural practices.

The study recommended for: improved availability of credit to all actors in the value chain; improvement in the attractiveness of the Nigerian rice which has better and fresher taste, through niche marketing to the middle and upper income groups; and lastly ensure that Nigerian input sector works to benefit the farmers. The study also identified Nigeria as the country with the highest potential for rice production in the region, due to its more than

47,000 ha of rice irrigation schemes, of various sizes, that have not been put into use. In contrast to Nigeria, in Mali producer organizations were found to play important role in the rice sector, from input supply, to processing and marketing.

A comprehensive study of the Nigerian rice sector was jointly undertaken by West Africa Rice Development Association (WARDA) now Africa and Rice Center (Africa Rice) and Nigeria Institute of Social and Economic Research (NISER). The study was funded by United State Agency for International Development (USAID) tagged “The Nigerian Rice Economy in a Competitive World: Constraints, Opportunities and Strategic Choices” in 2003. The project was aimed at updating knowledge on current conditions under which rice is produced and processed in Nigeria. The rice sector study (WARDA, 2003) establishes the major underlying constraints for developing the rice economy, their causes and their effects -including rice consumption (Lançon *et al*., 2003a), rice production (Erenstein *et al.,* 2003; Kebbeh *et al.,* 2003), rice processing (Lançon *et al.*, 2003b), rice markets (Akande and Akpokodje, 2003) and rice policy (Akpokodje *et al.,* 2001).

Erenstein *et al.,* (2003) found that rice is first and foremost a cash crop in Nigeria. The producers are primarily small-holders farmers with limited capital resources. They cultivate an average of 8 ha to different crops in a year– of which 3.3 ha are devoted to rice. The returns to rice production are relatively limited; hence the need to improve productivity and reduce production costs to enhance competitiveness. Despite substantial use of external inputs, such as fertilizer and herbicides, input use efficiency was found to be very low. Rice yields are relatively low (1.9 tons per ha) and there is substantial scope for increasing yields and enhancing input use efficiency. The survey concluded that for rice production to become more attractive and competitive, an enabling environment, whereby access to markets (input and output) and market information, is needed. Standardization of units and quality grades has a significant role to play. Kebbeh *et-al* (2003) examined the challenges and opportunities for improving irrigated rice productivity in Nigeria. The study found significant declines in irrigated rice yields. Yields and profits obtained by small-scale farmers were generally higher than those obtained by medium and large scale farmers. They concluded that significant production gains can be achieved by better utilization of existing infrastructure and suggested that, irrigation development policy should focus on improving the performance and efficiency of existing irrigation infrastructure, rather than investment in new schemes. Erenstein *et-al* (2004) observed that the only sustainable and socially acceptable way forward for Nigerian rice sector is to enhance the competitiveness of local rice against imported rice, in terms of quality and price. This calls for improving quality management and increasing efficiency along the entire marketing chain. They suggested the need to depart from business as usual syndrome and to focus on consumer demands. They pointed out that even though productivity improvements are needed to enhance the price competitiveness of Nigerian rice, a complementary and equally important need, is the improvement in the quality competitiveness of Nigerian rice.

A more recent study on rice value chain in Nigeria was by USAID (2009). The study showed that total sales of rice exceed $5 billion per year, $3 billion of which are from imports. Thus there is a significant rice market in Nigeria. The value chain for domestically produced rice is currently dominated by a largely fragmented production and milling industry, with limited new investment in either production or processing. But with some new investments (i.e., Olam and Veetee private-sector mills) in heavier milling capacity in new channels the sector can offer good private-sector driven models that can compete with imports for the high-end urban market, offer lower prices to consumers, yield, high profit margins to both the producers and the millers and contribute to a more efficient value chain that improves food security in

Nigeria. The study identified the major constraint as the lack of a consistent, reliable supply of high-grade paddy to the mills, and therefore a viable large mill requires investment in developing reliable supply. It suggested that an efficient, dynamic and commercially oriented set of rice value chain support services and product providers, including agro-input supply, farm mechanization services, finance, extension services and marketing services are needed to make domestic rice competitive.

Around the study area, a number of value chain studies were conducted, notably by two major projects that worked in the area. These are the agricultural development in Nigeria (ADENI) and Promoting Pro-Poor Opportunities in Commodity and Service Markets (PrOpCom) projects. ADENI Project, a 5 year (2003-2008) development project, was sponsored by the French and Nigerian governments and implemented by a French – Nigerian team housed at the National Agricultural Extension and Research Liaison Services (NAERLS) in Ahmadu Bello University Zaria. One of the project's objectives is "Improving farmers' linkages to markets opportunities through the provision of appropriate services". It was realized that a comprehensive analysis of farmers' marketing environment is required before the objective can be achieved. The commodity chain analysis (CCA) provides such an analytical framework. It has been widely applied as a tool at the policy, program or project planning level. Recently the tool is increasingly being used in the context of decentralized decision making process to assist CC stakeholders in their decision making. A training of potential resources persons on Commodity Chains analysis was organized by ADENI project. The objective is to establish a pool of resource persons that farmers group could mobilize to assist them in tackling agricultural product marketing issues. The training was coordinated by and conducted by CIRAD (Lancon and David-Benz (2004)). The eight trained participants conducted the first set of studies addressing ADENI farmers groups' preoccupations. These were cotton in Mairuwa site, Katsina state (Kudi and Barde, 2005), cattle in KRIP (Haruna and Murtala, 2005), groundnut in Gaya Kano state (Ilu and Maiyaki, 2005) and tomato in Kadawa, Kano state (Aminu and Musa, 2005).

Promoting pro-poor opportunities through commodity and Service markets (PrOpCom) is funded by the United Kingdom Department for International Development (DFID). It is aimed at facilitating the functionality and efficiency in Nigerian commodity and service markets in ways which assure that these markets benefit the poor. It emphasizes market-led development, linking market developments to policy reform. The programme contributes to removing constraints to efficient market operations and linking market actors to work together and serve each other on a sustainable basis. These were accomplished by addressing poor market functioning, with the objective of improving access and returns to the livelihood assets of the poor. During the pilot implementation phase, PrOpCom focused on the rice value chain in Kano and South-western Nigeria. A number of surveys were carried out in the project which include but not restricted to the followings; PrOpCom 2007a; PrOpCom 2007b; PrOpCom, 2007c.

CHAPTER THREE

3.0 METHODOLOGY

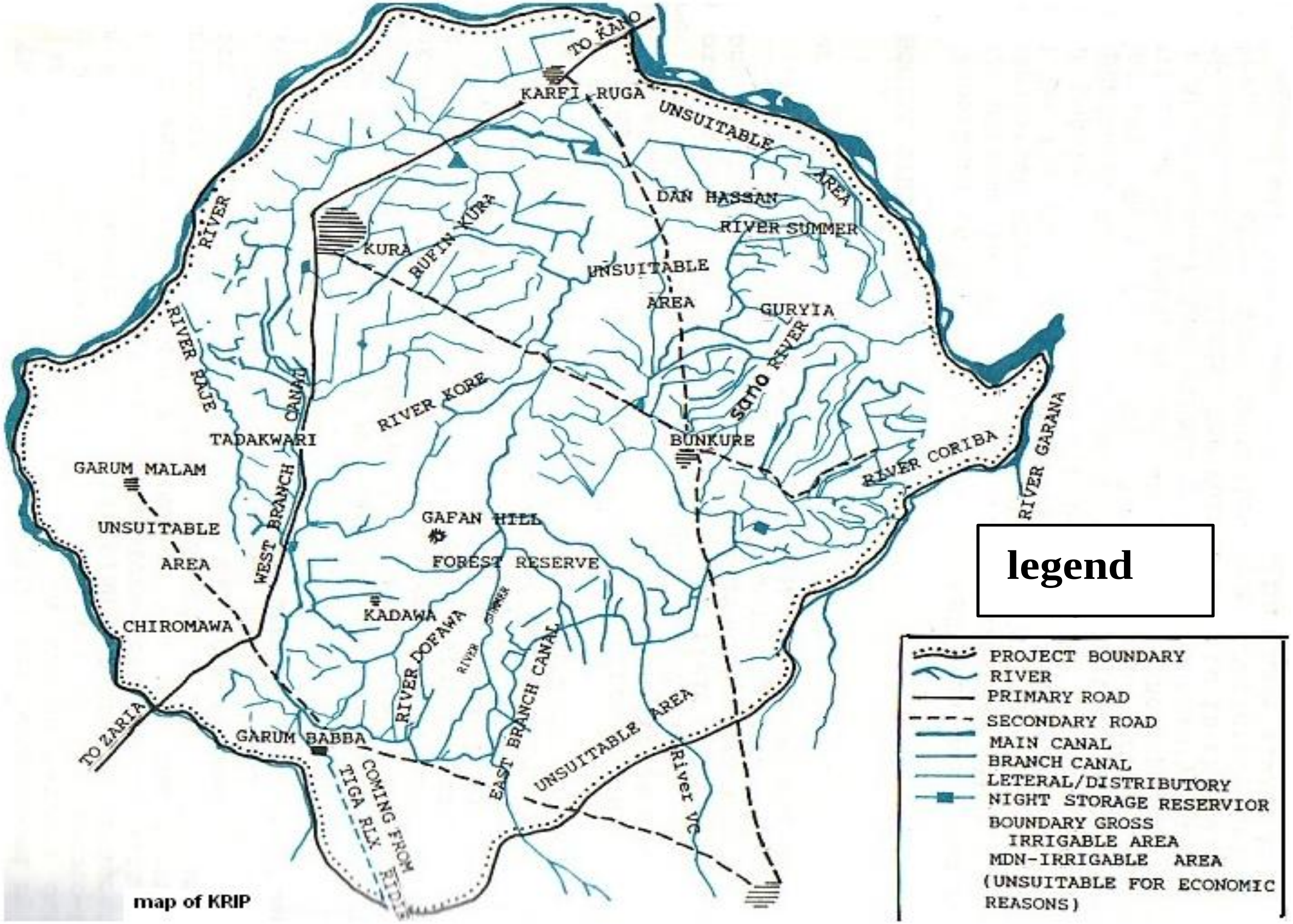
3.1 Study area

The study was carried out in Kano River Irrigation Project inKano State, located between latitudes 13^0 N and 11^0 S and longitude 8^0 W and 10^0 E. Kano State has a land mass of about 20,760km^2.As at 2014, the State has a projected population of 11,923,539 with annual growth rate of 3.2% (NPC, 2006). The State is agrarian, as more than 65 percent of the working adults are engaged in farming and farm related activities for their means of livelihood. The average annual rainfall is 700mm, with the mean daily maximum and minimum temperatures of $35^0$and 19^0Celcius respectively. The major crops grown in the State include rice, millet, maize, cowpea, vegetables and groundnut (NAERLS, 2012).

Kano River Irrigation Project (KRIP) is one of the pioneer large scale public irrigation schemes in Nigeria. KRIP was established in 1969 in Kano state (Fig. 3.1). The project has potential for irrigating 62,000 hectares of land, but only the first phase (KRIP1), which covers an irrigable area of 25,606 ha, has been completed. This area revolves around Kura, Bunkure and Garun mallam local government areas, and is known for rice activities and is referred to as Kura-Kano rice corridor (PropCom 2007). The major rice processing and marketing activities are carried out around Ciromawa, Kura, Karfi and Tamburawa, along the Zaria-Kano express way.

SOKOTO
KATSINA
JIGAWA
YOBE
BORNO
Maiduguri
Kano
KANO
ZAMFARA
KEBI
BENIN
Zaria
Kaduna
KADUNA
BAUCHI
GOMBE
NIGER
ADAMAWA
ABUJA
PLATEAU
NASSARAWA
KWARA
Ilorin
Ogbomosho
Oshogbo
Ado-Ekiti
Ibadan
TARABA
KOGI
BENUE
Abeokuta
LAGOS
Lagos
EDO
ENUGU
Enugu
Onitsha
EBONYI
CROSS RIVER
DELTA
RIVERS
AKWA IBOM
Port Harcourt
Slave Coast
Bight of Benin
of Guinea
Bamenda
Bafoussam
CAMEROON
Niamey
Maradi
Zinder
Lake Chad
Garoua


DAMBATTA
KUNCHI
MAKODA
TSANYAWA
BICHI
MINJIBIR
GABASAWA
DAWAKIN
TOFA
BAGWAI
TOFA
UNGOGO
GEZAWA
SHANONO
RIMIN GADO
KUMBOTSO
WARAWA
AJINGI
GWARZO
KABO
DAWAKIN
KUDU
MADOBI
GARUM
MALLAM
GAYA
KARAYE
KIRU
KURA
WUDIL
BUNKURE
ALBASU
GAYA(?)
GARKO
ROGO
BEBEJI
RANO
TAKAI
KIBIYA
TUDUN WADA
SUMAILA
DOGUWA


TO KANO
KARFI RUGA
UNSUITABLE AREA
DAN HASSAN
RIVER SUMMER
RIVER
KURA
RUFIN KURA
UNSUITABLE
AREA
GURYIA
RIVER RAJE
Sano RIVER
CANAL
RIVER KORE
TADAKWARI
BUNKURE
GARUM MALAM
WEST BRANCH
RIVER CORIBA
RIVER GARANA
GAFAN HILL
UNSUITABLE
AREA
FOREST RESERVE
KADAWA
CHIROMAWA
RIVER DOFAWA
EAST BRANCH CANAL
UNSUITABLE AREA
TO ZARIA
GARUM BABBA
COMING FROM TIGA RLX
River VC
legend
PROJECT BOUNDARY
RIVER
PRIMARY ROAD
SECONDARY ROAD
MAIN CANAL
BRANCH CANAL
LETERAL/DISTRIBUTORY
NIGHT STORAGE RESERVIOR
BOUNDARY GROSS IRRIGABLE AREA
MDN-IRRIGABLE AREA
(UNSUITABLE FOR ECONOMIC REASONS)
map of KRIP

3.2 Sampling Procedure and Sample Size

A total of six major chain actors; input dealers, producers, traders, processors (par boilers and millers) marketers and consumers were involved in the study. In addition to the major actors, service providers were also included. This included research and extension services, business development service providers, farmers' association and the NGOs working with them. This was aimed at ascertaining the contribution of the support service providers to the major actors. A combination of stratified and probability random sampling technique was used to select respondents for the data collection. A reconnaissance survey earlier conducted in the area (Table 3.1) showed that there are more than 57 grass-root farmers groups, called water user association (WUA), under the auspices of the Hadejia Jamaare River Basin Development Authority. The WUAs are grouped at sector level into 13 associations and the associations are consolidated into one apex body. The processors, parboilers and millers, as well as, milled and paddy rice traders have functional associations in the study areas (Table 3.1).

Both primary and secondary data were used in the study. Combinations of qualitative and quantitative techniques were used to collect the relevant data. The qualitative information sourced included but not restricted to; description of the strategic business relationship among actors, nature and mode of flow of rice between actors along the value chain, mode of exchange and nature of transactions with other business partners. Generally the qualitative information was sourced specifically to provide meaningful insights into the perception and strategies of producers, traders and service providers on various issues and specific business situations. It was used for mapping the flow of rice along the value chain. The following techniques were used for the data collection: key informant interviews, focus group discussion, assessment of the services and service providers. In addition, structured questionnaires were administered to collect specific quantitative information from the respondents. The information collected included respondents’ socio-economic characteristics, detailed input output data on production, marketing, and processing.

Table 3.1: Type and number of chain actors selected for the study

NO	ACTORS		SAMPLING FRAME		SAMPLE SIZE	
			Individual	**Assoc.**	**Individual**	**Assoc.**
1	Input Suppliers		50	3	10	1
2	Farmers		20,500	57	550	5
3	Traders (Paddy)		230	8	20	2
4	Processors					
	i.	Par boilers	500	12	20	5
	ii	Millers	134	15	10	2
5	Marketers (milled)					
	i.	Wholesalers	7	Nil	3	
	ii	retailers	220	16	30	3
6	Service Providers					
	i.	Research	2	0	1	0
	ii.	Extension	3	0	3	0
7	Consumers					
	i.	Individual	many	none	50	0
	ii	Institution	many	none	10	0
		Total			**707**	**23**

Source; Reconnaissance Survey data, 2013

3.3 Data Collection

Socio-economic data on some variables such as age, education, years of experience, marital status and family size of the major agents in the rice value chain were collected using structured instruments. Socio-economic characteristics are known to influence adoption of improved technologies and hence income of the entrepreneurs. Input output data on production; processing and marketing activities were also collected. These were used to calculate the actual income derived from the activities and the attendant costs incurred. In addition to that, the volume and value of production, cost of intermediate inputs, expenditure on salaries, financial charges, taxes and annual depreciation on equipment and machinery were also collected from each major agent.

3.4 Analytical Techniques

To achieve the objectives of the study the following analytical tools; descriptive statistics, conjoint analysis, budgeting technique and commodity chain analysis were used.

3.4.1 Descriptive statistics

Simple descriptive statistics such as measures of central tendencies, ratios, percentages, frequency distribution, cross tabulation were used to achieve objectives i and iv.

3.4.2 Conjoint analysis

Conjoint analysis (Bilyana *et al*, 2010) was used to measure local rice attributes that appealed consumers, to satisfy part of objective i. The relative importance of product attributes was calculated using the part-worth utility values from the ordered probit model (Harrison *et al.*, 2002, Yen, 2006). Equation 3.1 was used for the estimation;

$$\mathrm{V} = \sum_{j=1}^{n} \mathrm{b_j x_{ij}} \quad \text{……………………………}3.1$$

$$V = \alpha + b_1x_1 + \ b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . . b_{14}x_{14} + e$$

Where $V = \ Utility$

Y= Preference = Utility – Parthworth = Dependent Variable

X1 =Price (Naira per Kg of Milled Rice); X2= Taste (Ranked using Likert (1 -5))

X3=Swelling characteristics (Ranked using Likert (1 -5));

X4= Ease of cooking (Ranked using Likert (1 -5))

X5= Minimal usage of ingredients (Ranked using Likert (1 -5));

X6= Aroma (Ranked using Likert (1 -5)

X7= stickness (Ranked using Likert (1 -5));

X8= Grain texture (1= Coarse, 2= Smooth)

X9= Colour (1= Brown, 2= White);

X10= Level of Impurities (Ranked using Likert (1 -5))

X11= Grain Size (1= Short grain, 2= Medium size grain, 3=Long grain)

X12= Grain shape (1=Very Slim, 2= Slim shape, 3= Thick Shape)

X13= Level of breakage (Ranked using Likert (1 -5))

X=14 Packaging (1= Small (less than 10Kg), 2= medium (11 – 25Kg),

3= big (26 – 50Kg)

3.4.3 Budgeting technique

The simple budgeting technique was used to achieve objective iii. Net Income according to Castle *et al* (1987) is expressed as follows:

$$NI = GI - (TVC + TFC) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (1)$$

Where;

NI = Net Income

GI = Gross Income

TVC = Total Variable Cost

TFC = Total Fixed Cost

3.4.4 Commodity chain analysis

The commodity chain analysis *"l' approche filière"* is a value-free technique used in analyzing existing marketing chains for agricultural commodities to assess how public policies, investments and institutions affect local production systems. It consists of quantitative analysis of inputs and outputs, prices and value added along a given commodity chain using agent accounts (FAO, 2005). In its general form, it includes functional, flow, technical, financial and economic analysis. In this study, the functional and financial analyses were used to satisfy part of objectives two, three and four.

a. Functional analysis

The functional analysis involved identifying actors, activities and the interaction between them. The principal functions in the chain, the agents or sub-agents that carried them out and the products that emerged from the chain were identified. The information was then summarized in form of commodity flow chart.

b. Financial Analysis

The value added by an agent, is the wealth (Y) created, minus the wealth created by others (intermediate inputs (II). FAO (2005) defined value added as**:**

$$VA = Y - \mathrm{II}$$

Where: VA = value added during the accounting period.

Y = the value of the output produced during the accounting period

II **=** the value of intermediate inputs used

Alternatively the value added can be estimated from the following identity:

$$VA = PE + interest + taxes + Grossprofit$$

Value added is thus composed of four elements; personnel remuneration (PE), interest charges, Taxes and duties and Gross profit, representing the return (or loss) to the activity under consideration.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Major Chain Actors

There are many value chain stakeholders that carry out different activities along the rice value chain, with the aim of generating employment and income or both for themselves. Some of them generate tangible products such as seed, fertilizer and paddy rice. Others provide services, such as parboiling, milling, transportation, research and Extension. In addition there is also a beneficial lateral and vertical relationship between the stakeholders. The following actors were identified; Inputs suppliers, Farmers, paddy traders, parboilers, millers and consumers. In this section some of the socio-economic characteristics of the value chain actors were discussed in relation to the functions performed.

4.1.1 Input suppliers

In some cases input dealers are considered the beginning of the rice value chain. They sell essential inputs to farmers for the production of paddy. The socio-economic characteristics of the input sellers are shown in Tables 4.1, 4.2 and 4.3. The result showed that input dealers have an average age of 44 years and it appears they started the business at an early age, as the average length of time spent in the business by most of them was about 15 years (Table 4.1). All the input dealers interviewed were male and were fairly well educated. About 27 percent of them had passed through some form of post- secondary education. For instance Kura local government area had the highest number of traders that had passed through post-secondary school. While about 50 percent had secondary education more than 70 percent had passed through primary school (Table 4.2). This appears to be in line with the intellectual requirement of selling modern inputs that required sound educational background to decode the technical information contained in the inputs.

Table 4.1 Age and experience of input suppliers

L G A	Variables	Age (years)	No of years in the business
Bunkure	Mean	42.9	17.1
	Std. Deviation	7.795	5.744
	Minimum	30	5
	Maximum	52	23
	N= 3		
Garun mallan	Mean	44.5	12.9
	Std. Deviation	5.893	8.425
	Minimum	32	2
	Maximum	52	30
	N= 3		
Kura	Mean	43.8	14.7
	Std. Deviation	7.857	7.212
	Minimum	32	6
	Maximum	60	30
	N= 4		
Total	Mean	43.73	14.9
	Std. Deviation	7.017	7.174
	Minimum	30	2
	Maximum	60	30

N= 10

Source: Survey data, 2014

Majority (87%) of the respondents indicated that trading was their main occupation. Farming was the second main occupation reported. The major inputs sold include, but not restricted to, fertilizer, seeds, agrochemicals, water pumps and sprayers. Majority of them (40%) reported being involved in the sales of all the listed inputs. About 27 percent were engaged in selling fertilizer only while 17 percent were primarily concerned with the sales of seeds. About three percent were engaged in the sales of water pump and sprayers.

Table 4.2: Socioeconomic characteristics of inputs suppliers (%)

Variables		**Bunkure**	**Garun malam**	**Kura**	**Total**
Gender	Male	100.00	100.00	100.00	100.00
	Female	0.00	0.00	0.00	0.00
Educational status	Qur'anic Education	60.00	30.00	30.00	40.00
	Primary	20.00	20.00	0.00	13.30
	Secondary	10.00	50.00	0.00	20.00
	Post-secondary	10.00	0.00	70.00	26.70
Primary occupation	Farming	10.00	20.00	20.00	16.70
	Trading	90.00	80.00	80.00	83.30
Secondary occupation	Civil servant	10.00	0.00	0.00	3.30
	Farming	50.00	70.00	90.00	70.00
	Milling	20.00	0.00	0.00	6.70
	None	10.00	20.00	10.00	13.30
	Provision	10.00	0.00	0.00	3.30
Type of input supply	Fertilizer	30.00	30.00	20.00	26.70
	Seeds	30.00	0.00	20.00	16.70
	Agro chemicals	20.00	0.00	10.00	10.00
	Water pumps	0.00	10.00	0.00	3.30
	Sprayers	0.00	10.00	0.00	3.30
	All	20.00	50.00	50.00	40.00

Source: **Survey data, 2014**

Majority of the traders (70%) reported belonging to one form of association or another. However more than half (60%) admitted receiving little or no benefit from the associations (Table 4.3). However few that have benefited from the associations indicated the followings; credit, market information, bulk marketing and training, as the major areas they have benefited from. This finding raises serious concern, given the educational level attained by the input dealers, that they are not deriving tangible benefits from their associations.

Table 4.3: Membership of association and benefits derived by input suppliers (%)

Variables		**Bunkure**	**Garun malam**	**Kura**	**Total**
Belong to an association	Yes	70.00	70.00	90.00	76.70
	No	30.00	30.00	10.00	23.30
Benefits derived from association	Credit	0.00	10.00	10.00	6.70
	Bulk marketing	20.00	10.00	10.00	13.30
	Market information	0.00	10.00	0.00	3.30
	Training	20.00	20.00	30.00	23.30
	All of the above	0.00	10.00	30.00	13.30
	None	60.00	40.00	20.00	40.00

Source: Survey data, 2014

4.1.2 Farmers

Farmers combine various inputs such as; seed, fertilizer, labour, water and managerial skill to produce paddy. The injection of paddy into the rice value chain by farmers initiates the major activities in the chain. Paddy rice is produced mainly within the irrigated project area during the rainy season (May to September) under rain-fed condition. Rain is the major source of water, but is supplemented with irrigation water, whenever there is shortage of rainfall.

A number of socio-economic characteristics of farmers which include, but not restricted to age, marital status, level of education, membership of farmer association, family and farm sizes were examined. Majority of the farmers were men, within the productive ages of 45 to 50 years (Table 4.4). This finding was similar to that of Ayoola *et al* (2011) and Kebbeh *et al* (2003). Kebbeh found that the average age of rice farmers in Kaduna and Niger States of Nigeria was 47 years. Similarly, Tsega *et al,* (2005) found that the national average age of rice producers in Ethiopia was 40 years. In addition to that the result indicated that 98 per cent of the respondents were married, similar to findings in Ethiopia, where 90 percent of the rice producers are married (Tsega *et al*., 2005).

Majority (60%) of the farmers had post-secondary level education while 21 percent and 13 percent had passed through secondary and primary education respectively (Table 4.4). In total, more than 95 percent of the rice producers were found to be literate. This result contrast with the findings of Tsega *et al* (2005), Khattak and Hussain (2008) who found a high level of illeteracy among rice farmers. Kebbeh et al., (2003) also found that about 29 percent of rice farmers in Kaduna and Niger State of Nigeria did not have any form of formal education. Based on their high level of literacy, it is expected that rice farmers should have good understanding of the potentials of improved rice production technologies.

More than 70 percent of the rice farmers belong to farmer based organization. This was similar to the findings of Ayoola *et al.* (2011). However despite their high level of education, majority (88%) of the farmers reported driving little or nobenefit from the associations. Even those that reported obtaining some benefits indicated that the benefits were intangible and infinitesimal. This raises serious questions on the viability, functionality and responsiveness of the associations to their members' needs.

Table 4.4: Demographic characteristics of farmers (n=300)

Variables		Bunkure	Garun malam	Kura	Total
Gender	Male	99.0	96.0	97.0	97.3
	Female	1.0	4.0	3.0	2.7
Age (years)		46.22	48.04	41.41	45.22
Marital status	Married	99.0	99.0	96.0	98.0
	Single	1.0	1.0	4.0	2.0
Major occupation	Animal rearing	8.0	4.0	6.0	6.0
	Farming	86.0	95.0	92.0	91.0
	"Okada" riding	6.0	1.0	2.0	3.0
Educational level	Qur'anic education only	5.0	2.0	0.0	2.3
	Primary education	36.0	11.0	17.0	21.3
	Secondary education	9.0	13.0	18.0	13.3
	Post secondary education	47.0	73.0	64.0	61.3
	None	3.0	1.0	1.0	1.7
Membership of association	Yes	76.0	74.0	73.0	74.3
	No	24.0	26.0	27.0	25.7
Rank in association	Executive	4.0	11.0	18.0	9.8
	Ordinary member	96.0	89.0	82.0	89.2
Benefit derived	Bank loan	0.0	5.0	6.0	3.6
	Fertilizer subsidy	1.0	4.0	0.0	1.7
	Linkage with various Stakeholders	1.0	0.0	4.0	8.0
	Seeds	2.0	2.0	7.0	3.7
	Subsidy from govt.	1.0	0.0	0.0	.3
	None	95.0	89.0	79.0	87.7

Source: Survey data 2014.

The average farm holding in the area was 2.6 hectares and more than half of it is devoted to rice production in all the three local government areas (Table 4.5). Thus, given the nature of the farm size, majority of the farmers in the area are small scale farmers. The classification of farms into either large or small scale depends on the agricultural system settings, the geographical area and to a large extent the type of enterprise. Olayide *et al* (1980) described small scale farms as those with less than 10 hectares. Adesina and Djato (1997), as well as, Ohajianya and Onyenweaku (2002) defined small scale farms as those with less than 4 hectares. Federal Ministry of Agriculture and Rural development classified farms in Nigeria into three categories small, medium and large. Small scale farms are those with less than 5 hectares, medium scale farms are those with between 5 and 20 hectares and large scale farms those with more than 20 hectares (FMARD (2010). This classification is adopted in this study.

The mean family size of rice producers in the area was 9 persons per family and an average of two families in a household (Table 4.5). The family size had little effect on the output of rice, as most farmers use hired labour. Similarly Khattak and Hussain (2008) found an average family size of 9 persons per rice-farming household in India. However the average output of rice obtained by farmers in the survey area of about 2.9 tons/ha, was very low compared with the findings of Singh *et al.* (1997) of an average yield of 4.6 tons per year. Akpokodje *et al.* (2001), found similar result and recommend increase in productivity in order to enhance competitiveness of Nigeria rice.

Table 4.5: Socioeconomic characteristics of farmers

Local Govt.	Parameters	Age (yrs)	Farming experience (yrs)	Farm holdings (ha)	House hold size	Rice production Area (ha)
Bunkure	Mean	46.22	2.779	2.6390	7.70	1.314
	Std. Deviation	15.048	2.7760	2.64143	5.875	1.7123
	Minimum	20	0.0	0.00	0	.8
	Maximum	85	14.0	14.00	33	12.0
	Kurtosis	-.632	3.214	4.222	3.953	32.027
	Variance	226.456	7.706	6.977	34.515	2.932
	Std. Error of Mean	1.505	.2776	.26414	.587	.1712
Garun Malam	Mean	48.04	3.230	2.6620	9.18	1.800
	Std. Deviation	13.289	4.9706	4.05559	9.670	3.4484
	Minimum	25	0.0	0.00	0	.8
	Maximum	76	36.0	36.00	45	20.0
	Kurtosis	-.831	23.857	46.461	3.583	22.724
	Variance	176.584	24.707	16.448	93.503	11.892
	Std. Error of Mean	1.329	.4971	.40556	.967	.3448
Kura	Mean	41.41	2.877	2.4800	8.85	1.545
	Std. Deviation	11.695	3.9020	3.95698	7.127	2.5026
	Minimum	20	0.0	0.00	0	.7
	Maximum	73	36.0	36.00	32	25.0
	Kurtosis	.379	53.049	52.531	1.361	79.802
	Variance	136.770	15.225	15.658	50.795	6.263
	Std. Error of Mean	1.169	.3902	.39570	.713	.2503
Total	Mean	45.22	2.962	2.594	8.58	1.553
	Std. Deviation	13.660	3.9763	3.59819	7.721	2.6498
	Minimum	20	0.0	0.00	0	.7
	Maximum	85	36.0	36.00	45	25.0
	Kurtosis	-.453	35.514	48.813	4.323	44.568
	Variance	186.582	15.811	12.947	59.609	7.021
	Std. Error of Mean	.789	.2296	.20774	.446	.1530

Table 4.6: Membership of farmer based organization and benefit derived

Variables		Bunkure	Garun malam	Kura	Total
Membership of association	Yes	70	60	100	76.7
	No	30	40	0	23.3
Most important Associations	Bunkure rice marketers association	40	0	0	17.4
	Cooperation	10	10	10	13
	Kankwana rice millers assoc.	10	10	50	30.4
	Karfi water users association	0	20	20	17.4
	Rice marketers group	10	0	0	4.3
	Samawawua	0	0	10	4.3
	Yantomowua	0	20	10	13
Status in the association	Executive	60	70	50	60
	Member	40	30	50	40
Benefits derived	Cooperation among members	0	0	70	23.3
	Information on market prices	70	70	0	46.7
	Linkage to government agencies	30	30	0	20
	Loan from Bank of Agriculture	0	0	20	6.7
	Awareness on marketing price	70	40	10	40
Type of Rice marketed	Milled rice	0	10	10	6.6
	Paddy	100	90	90	93.4

4.1.3 Paddy rice marketers

Paddy rice marketers perform an important function of assembling and making paddy available to other actors in the rice value chain. They buy paddy rice from farmers and other traders from the irrigated area, as well as, from other local government areas. The marketers were male in their mid- forties. They travel a lot, both within and outside the irrigated perimeter. They reported travelling to towns in Kaduna state such as; Makarfi, Soba, Zaria and Saminaka, to buy paddy rice. Majority of the traders only had primary education. Less than 4 percent had gone beyond secondary school (Table 4.7). The major occupation of the traders is rice trading. In spite of their low level of education most of them belong to marketing association. The major reported benefits were; linkage to agencies, access to price information and credit. A few of them (7%) reported rice milling to be their major occupation. About 35 percent are engaged in selling milled rice.

Table 4.7 Socio-economic characteristics of paddy rice marketers

Variables	Items	Bunkuru	Garun malam	Kura	Average
Age	(years)	37	43	45	42
Gender	Male	100	100	100	100
	Female	0	0	0	0
Educational status	Primary	45	40	60	73
	Secondary	15	10	20	15
	Post secondary	0	10	0	3.3
Major Occupation	Farming	15	20	10	15
	Rice milling	5	10	5	7
	Rice selling	80	70	85	78
Membership of association	Yes	75	65	85	75
	No	25	35	15	25
Benefits of Membership of Association	Contact with Government Agency	25	20	10	18
	Loan from Banks	10	20	20	17
	Access to price information	50	40	30	40
Do you market milled rice	Yes	30	35	40	35
	No	60	45	50	52
Do you sale paddy	Yes	95	95	90	93
	No	5	5	10	7

4.1.4 Parboilers

Parboiled rice is the most preferred type of rice in Nigeria (USAID, 2009). This made parboiling one of the most important processing operations besides milling. The process is dominated by women, who use traditional techniques to parboil rice. The parboiling process consists of soaking paddy in hot water in a local drum, followed by a rapid exposure of the soaked paddy to steam and a gradual drying and cooling for at least one day. The use of local drums allowed the women to monitor the boiling temperature of the paddy. The earlier technique of soaking paddy in cold water for two days, and then heating until the grains show signs of splitting, was abandoned due to increased number of broken grains on milling. Parboiling business is dominated by women (85%) in the area. Perhaps because parboiling is an act of cooking, this is usually associated with women in the Hausa land. Most of the women are in their mid-forties and are married (table 4.7). More than 90 percent of them had put in about fifteen years in parboiling.

Table 4.8: Age, household size and experience of parboilers

Local govt. Area	Variable	Age (yrs)	Household size	Years in parboiling
Bunkure	Mean	44.4	14	17.3
	Std. Deviation	5.296	3.651	6.201
	Std. Error of Mean	1.675	1.155	1.961
	Variance	28.044	13.333	38.456
Garun Mallam	Mean	42.2	12.4	12.9
	Std. Deviation	6.391	3.134	8.987
	Std. Error of Mean	2.021	0.991	2.842
	Variance	40.844	9.822	80.767
Kura	Mean	42.6	12.4	14.5
	Std. Deviation	5.317	3.273	7.735
	Std. Error of Mean	1.681	1.035	2.446
	Variance	28.267	10.711	59.833
Total	Mean	43.07	12.93	14.9
	Std. Deviation	5.577	3.331	7.68
	Std. Error of Mean	1.018	0.608	1.402
	Variance	31.099	11.099	58.99

Source: survey result, 2014

Education as a means of acquiring knowledge and skills essential for the improvement of livelihood through efficient utilization of resources has eluded majority (80%) of the parboilers. The few (20%) that were educated did not pass beyond primary education. Most of the women were taught the art of parboiling at early age by their parent. Parboiling was also the major source of employment, as well as, income for the women (Tables 4.8 and 4.9).

Table 4.9: Demographic characteristics of par boilers (%)

Variables	Items	Bunkure	G/mallam	Kura	Total
Gender	Female	90	80.00	80.00	83.30
	Male	10	20.00	20.00	16.70
Marital status	Married	90	60.00	80.00	76.70
	Single	10	20.00	10.00	13.30
	Divorced	0	20.00	10.00	10.00
Educational status	Qur'anic Educ.	90	70.00	80.00	80.00
	Primary Educ.	10	30.00	20.00	20.00
	Secondary Educ.	0	0.00	0.00	0.00
Rice Parboiling as major occupation	Yes	100	100.00	100.00	100.00
	No	0	0.00	0.00	0.00
Rice Parboiling as major source of income	Yes	100	100.00	100.00	100.00
	No	0	0.00	0.00	0.00
Other source of income	Trading	10	20.00	10.00	13.30
	Rice farming	0	0.00	10.00	3.30
	Processing other commodities	20	0.00	20.00	13.30
	Livestock rearing	70	80.00	60.00	70.00
Who Taught you Parboiling	Parents/relations	100	100.00	100.00	100.00
	Friends	0	0.00	0.00	0.00
	Neighbors	0	0.00	0.00	0.00
Who do you parboil for	Self	20	20.00	0.00	13.30
	Contract customers	0	10.00	10.00	6.70
	Both	20	0.00	50.00	23.30
	Others	60	70.00	40.00	56.70

Source: Survey data, 2014

4.1.5 Millers

Rice milling in Nigeria is a cottage industry, dominated by medium size workshops with a processing capacity of 150 to 300 kg/hr that is small-scale workshops that process less than 50 kg per hour (Lançon *et al.,* 2003). Although mills are mainly owned by men, the workshops area is are usually surrounded by women, old and young, providing one cleaning services such as winnowing and removal of stones and other unwanted debris. The millers were generally male and most of them (90%) were married. They were more educated then the farmers.

More than half of them had secondary education and about 7 percent had tertiary education. Majority (60%) of the millers were involved in farming in addition to milling. Ninety percent of the millers belong to association. But fifty percent of them indicated that they did not receive any form of benefit from the association. About 10 percent reported accessing loans with the help of the association.

Table 4.10: Socioeconomic characteristics of millers

Variables		**Bunkure**	**Garun malam**	**Kura**	**Total**
Gender	Male	100.00	100.00	100.00	100.00
	Female	0.00	0.00	0.00	0.00
Marital status	Married	90.00	100.00	100.00	96.70
	Single	10.00	0.00	0.00	3.30
Relationship with household Head	Self	50.00	20.00	60.00	43.30
	Son or Daughter	50.00	80.00	40.00	56.70
Highest Educational level Attained	Qur'anic only	50.00	40.00	40.00	43.30
	Primary education	10.00	40.00	40.00	30.00
	Secondary education	30.00	20.00	10.00	20.00
	Tertiary education	1000	0.00	10.00	6.70
Major occupation	Farming	60.00	70.00	50.00	60.00
	Trading	10.00	10.00	40.00	20.00
	Rice Milling	30.00	20.00	10.00	20.00
Do you Belong to any Association	Yes	90.00	90.00	100.00	93.30
	No	10.00	10.00	0.00	6.70
Benefit derived from association	None	50.00	70.00	60.00	50.00
	Loan	10.00	10.00	10.00	10.00
	Input	20.00	10.00	30.00	30.00
	Education & training	20.00	10.00	0.00	10.00

Source: Survey Data 2014

Another 10 percent of the respondent indicated that training was the major benefit they obtained from the association. About 30 percent of the respondents indicated 'having access' to inputs as the major benefit obtained from the association (Table 4.9). The millers are relatively younger than other rice value chain actors. Their mean age varies from 33 to 43 years. But they have been in milling business for about 6 to 8 years (Table 4.10). The family size of between 5 to 8 persons per household is also relatively small compared to what it used to be in the area. Perhaps this is related to their age, educational attainment and the income of less than one million naira generate annually.

Table 4.11: Age, Experience, Household size and income of Rice millers

Local government area	Parameters	Variables			
		Age (yrs)	Household size	Income (₦)	Year of experience
Bunkure	Mean	40.7	5.3	466,578	9.4
	N	20	20	20	20
	Std. Deviation	9.464	3.164	218,456	3.658
	Minimum	22	2	150,000	3
	Maximum	55	10	855,779	15
	Kurtosis	0.717	-1.398	-0.39	-0.328
	Skewness	-0.526	0.525	0.31	-0.332
Garun malam	Mean	44.3	7.9	448,600	6.7
	N	20	20	20	20
	Std. Deviation	11.833	6.691	220,455	2.058
	Minimum	30	2	125,000	3
	Maximum	66	25	801,000	9
	Kurtosis	-0.436	5.22	-0.23	-0.966
	Skewness	0.765	2.159	0.50	-0.549
Kura	Mean	33.1	6.3	711,605	8.4
	N	20	20	20.00	20
	Std. Deviation	7.578	3.433	357,211	4.719
	Minimum	20	2	250,000	1
	Maximum	45	14	1,443,561	15
	Kurtosis	-0.487	2.11	0.66	-0.799
	Skewness	-0.141	1.37	0.67	-0.083

Source: Survey Data 2014

4.1.6 Milled rice marketers

The milled rice marketers were also engaged in marketing paddy rice (Table 4.11), as paddy rice marketers were also reported to be engaged in selling milled rice. All the marketers interviewed were male with an average age of 47 years. The marketers had lower formal education compared to millers. Less than 50 percent of the marketers had primary education. Unlike the paddy sellers about 7 percent of them had secondary education. Kura had the highest number of educated marketers, as 70 percent of them had primary education.

Table 4.12 Socioeconomic characteristics of Rice Marketers

Variables	Items	Bunkure	Garun malam	Kura	Average
Mean Age	(yrs)	47	45	48	47
Gender	Male	100	100	100	100
	Female	0	0	0	0
Educational status	Primary	40	20	60	40
	Secondary	0	10	10	6.7
	Post secondary	0	10	0	3.3
Major occupation	Farming	10	20	10	13.3
	Rice milling	20	30	40	30.0
	Rice selling	70	50	50	56.7
Membership of association	Yes	70	60	100	76.7
	No	30	40	0	23.3
Benefits of Membership of Association	Link to government Agencies	30	30	0	20
	Loan from BOA	0	0	20	6.7

	Access to price information	70	40	10	40
Do you market milled rice	Yes	40	70	80	63.3
	No	60	30	20	36.7
Do you sale paddy	Yes	100	90	90	93.3
	No	0	10	10	6.7

4.1.7 Consumers

The consumers consist of individual households and institutions such as; hotels, schools and restaurants who patronize local rice. The information collected from the consumers was used to identify factors that influence their preference for local rice. Fourteen attributes that influence consumer preference were identified. Nine out of the fourteen variables were found to be significant at one percent (price, taste, swelling capacity, stickness, grain texture, colour, level of impurities, grain size and level of breakage. Aroma was significant at 5 percent and packaging was significant at 10 percent. However, ease of cooking, minimal use of ingredients and grain shape were not significant at all levels. Price appeared to be the single most important factor influencing consumer choice. A unit increase in price would lead to a decrease in quantity preferred by 4.3 units (Table 4.13).

Table 4.13 Rice Consumer Preference in KRIP

Preference	Coefficient	Standard error	Z-test
Price	-4.257*	1.175	-3.62
Taste	1.487*	0.549	2.71
Swelling	4.83*	1.676	2.88
Cooking	0.008	0.24	0.03
Ingredients	0.046	0.134	0.34
Aroma	-0.74**	0.337	-2.19
Stickiness	-5.915*	1.96	-3.02
Grain texture	10.161*	3.192	3.18
Colour	5.906*	1.715	3.44
Impurities	-2.198*	0.607	-3.62
Grain size	-1.501*	0.569	-2.64
Grain shape	0.219	0.267	0.82

Level of breakage	-1.701*	0.458	-3.71
Packaging	0.817***	0.423	1.93

Note: * significant at 1% level, ** significant at 5%, *** significant at 10%.

The results were similar to the findings of USAID (2009) were factors that influence consumer's choice of imported or domestic rice were identified and compared. Cleanliness, swelling capacity, taste and ease of preparation influenced the choice of imported rice. Price differential between imported and domestic rice appeared to be the major factor influencing the choice of domestic rice.

4.2 Flow of Rice along the Value Chain

The flow of rice was estimated using information collected from primary and secondary sources. A total of 35, 627 farmers, 25 irrigation sectors and 30 Water User Association (WUA) were identified in the study area. Two types of farmers, small and large scale, were identified. Small scale famers constituted more than 99 percent of the farming population in KRIP and contributed about 94 percent of rice production in the area. Large scale farmers constituted less than one percent of the population, but contributed more than 6 percent of the total rice output in the area (table 4.14).Large scale farmers obtain higher rice yield compared to their small scale counterparts. In addition to having higher yield, large scale farmers also devote more area of their total farmland to rice production relative to their small scale counterparts. An estimated 189,630 tons of paddy is produced by small and large scale farmers in KRIP.

Table 4.14: Estimated Number of Farmers and Rice Production in KRIP

Type of farm Holding	No of Farmers	%	Area Under Rice Cultivation (Ha)	Average Yield	Total Output	%

			Average farm size	Area to Rice	(Ton/Ha)	(Tons)	
Small Scale	35,362	99	2.6	1.56	3.2	178,182	93.96
Large Scale	265	0.74	12.8	9.6	4.5	11,448	6.04
Total	35,627	100				189,630	100

Source: Survey data 2014

The household production and utilization of rice was estimated based on information obtained from the small scale farmers. Such information was not available from the large scale farmers. It was estimated that on the average, a small-holder farmer in Kano River Irrigation Project produced about 43 bags (75kg) of paddy. About fifty percent (20 bags) is sold immediately to raise cash needed to pay debts and take care of pressing family needs. Fifteen bags are kept for sale at a later date. Four bags are given out as gift, three bags were consumed and one bag was stored as next year's seed (Table 4.15).

Table 4.15: Household Flow of Rice in KRIP

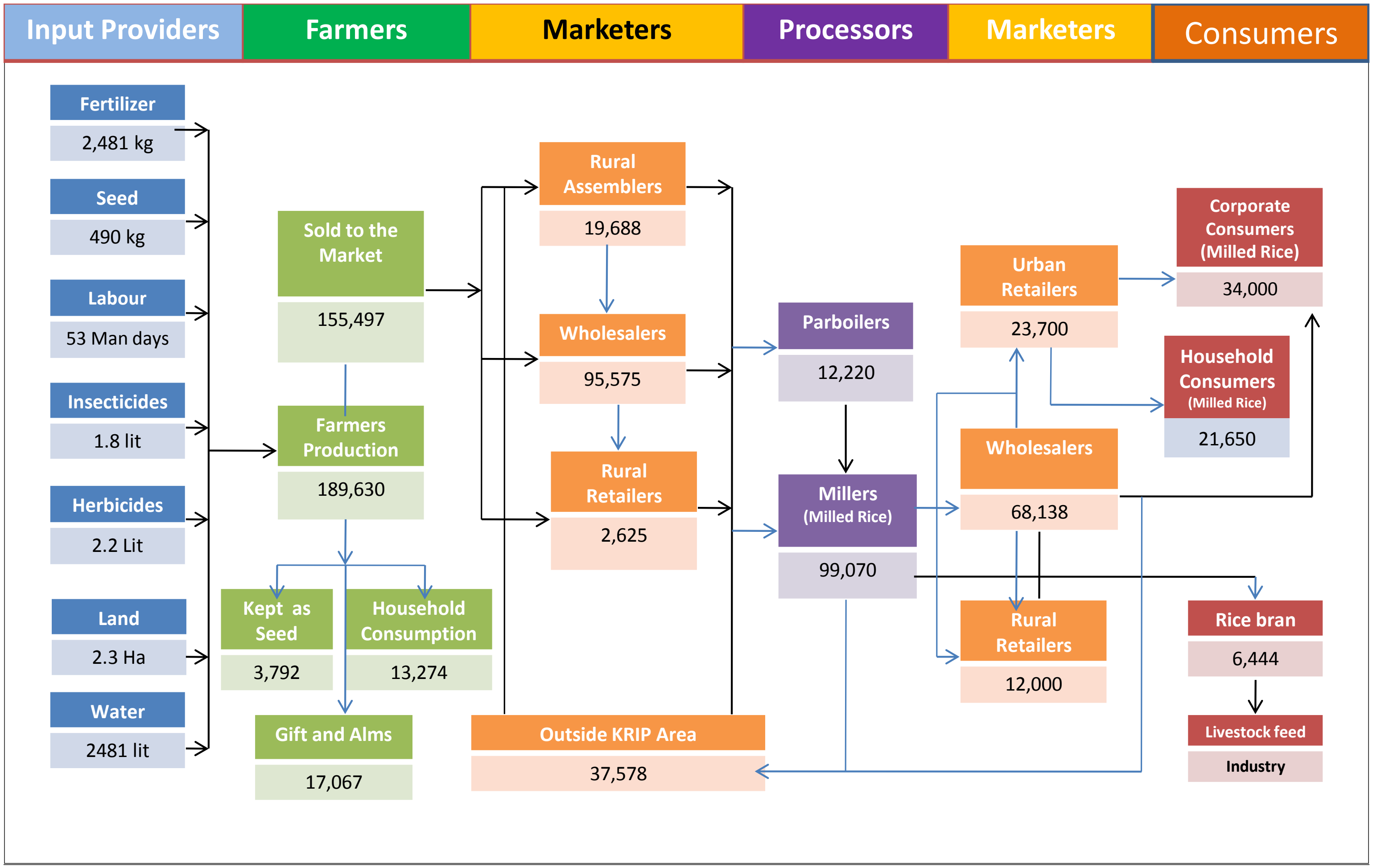
Source and Flow of Paddy	**Flow of Paddy Bags**	**%**
Quantity of paddy sold	20	46.51
Quantity reserved for sale later	15	34.88
Quantity given as gift and or alms	4	9.30
Quantity consumed at home	3	6.98
Quantity reserved as seed	1	2.33
Average Quantity of paddy produced	43	100.00

The information in tables 4.14 and 4.15 were used to estimate the flow of paddy in KRIP (Table 4.16).Out of the estimated 189,630 tons of paddy produced in the study area, more than 80 percent is sold to raise needed income by the farming families. About 50 percent is sold immediately after harvest and the remaining 30 percent of the produce is sold later in the year, close the planting season, to finance the next year's rice crop. About two percent of the production is kept as seed. Less than 10 percent of the total rice output is utilized in the house for consumption. It can therefore be concluded that rice is a cash crop in the study area.

Table 4.16: Flow of Paddy in KRIP

Source and Flow of Paddy	Flow of Paddy	
	Tons	%
Quantity of paddy sold after harvest	89,126	47
Quantity of paddy reserved for sale later	66,371	35
Quantity of paddy given as gift and or alms	17,067	9
Quantity of paddy consumed at home	13,274	7
Quantity of paddy reserved as seed	3,792	2
Quantity of paddy produced	189,630	100

The physical flow of paddy and milled rice from farmers through different channels via various actors to the consumers is mapped in figure 4.1. The major actors considered in drawing up the value chain map were; farmers, paddy and milled rice marketers, processors and consumers. Farmers obtained inputs such as; seed, fertilizer, pesticides, water, labour and land from different input providers and used their knowledge and managerial skills to produce paddy. An estimated 189,630tons of paddy was produced and injected into the chain by farmers. The bulk of the paddy is sold to the wholesalers through commission agents and rural assemblers. The major difference between the rural assemblers and commission agents is in the ownership of the commodity. Commission agents do not take ownership of the commodity and as such bear minimal risk. Rural assemblers, on the other hand, purchase and own the commodity. Majority of the paddy is moved to the processors and some moved out of the project area as paddy. But more than 70 percent is sold as milled rice.



Source: Survey Data 2014

Figure 4.1 Rice Value Chain Map of Kano River Irrigation Project, Kano state, Nigeria

4.3 Cost, Returns and Value Added by Major Actors

This section examined the costs incurred and the returns received by major actors along the rice value chain. It also examined the value added by them in the value chain. The major actors considered included; farmers, paddy traders, parboilers, millers and milled rice marketers. Each is discussed in the sub-sections below.

4.3.1 Farmers

The costs expended and the returns that accrued to farmers in the process of producing paddy are shown in Table 4.17. The table also showed the value added to the rice value chain by the farmers. A total of about ₦75, 000 was expended by famers in cultivating one hectare of rice. This was approximately equivalent to about ₦23 per kilogram of paddy. A kilogram of paddy was sold at about ₦ 60:00 Fifty percent of the total cost of production was from purchases of material inputs such as seeds, fertilizer and pesticides. Fertilizer is the most important contributor to the total cost; it contributes about 30 percent of the total cost of rice production. This is followed by seed, herbicides and insecticide.

Labour charges, harvesting, land preparation, planting and weeding constituted less than half (49 %) of the total cost of production. The less than 2 percent depreciation cost is an indication that farmers are still using traditional tools and equipments. But the fact that labour constituted less than half of the total cost is an indication that rice production in the area is gradually moving away from the traditional, low-input strategy where labour is substituted for inputs. Nigerian rice farmers are known to have adopted the low-input strategy to agriculture, with minimum input requirements and low output (IFAD, 2009 and Cadoni and Angelucci 2013).

Table 4.17: Cost, Returns and Value added by farmers in Paddy Production

Cost and Returns			Farmer Cost		
A		Cost	N/ha	N/Kg	%
1	Materials				
	i	Seeds	5,300	1.64	7.07
	ii	fertilizer	22,500	6.98	30.02
	iii	Herbicides	3,500	1.09	4.67
	iv	Insecticides	2,500	0.78	3.34
	v	Irrigation Water	1,500	0.47	0.77
	vi	Empty sacks	1,200	0.37	1.00
	Sub-total		36,500	11.33	48.70
2	Labour Charges				
	i	land preparation	10,500	3.26	14.01
	ii	Planting	3,500	1.09	4.67
	iii	Weeding	2,500	0.78	3.34
	iv	Herbicide application	2,500	0.78	3.34
	v	Insecticide application	1,500	0.47	2.00
	vi	Fertilizer application	2,500	0.78	3.34
	vii	Irrigation	1,500	0.47	2.00
	iix	Harvesting	8,500	2.64	11.34
	ix	Bagging	1,500	0.47	2.00
	x	Transportation	2,500	0.78	3.34
	Sub-total		37,000	11.48	49.37
3	Depreciation		1,450	0.45	1.93
4	Total Cost		74,950	23.26	100.00
B	Returns				
	1.2	Average output	3,222	1.00	

	2.2	price N/kg	60.67	60.67
	3	Total Revenue	195,479	60.67
	4	Net Revenue	120,529	37.41
C		Value Added		
	1	Intermediate Consumption	36,500	11.33
	2	Total Value Added	158,979	49.34

Source: Survey data 2014

As a result of the low-input strategy, Nigeria rice productivity is among the lowest within neighboring countries (USAID, 2009). However, despite the low productivity, rice production was found to be profitable in the study area. The total revenue from one hectare of rice production was about ₦200, 000 out of which ₦120, 000 was realized as profit. The net-return of a kilogram of paddy was about ₦37. This finding is similar to that of Islam and Ahmed (2010) in Adamawa state and Tinsley (2012) in Sokoto state. In Adamawa state farmers made between ₦75,000 to ₦110,000 in profit from the production of one hectare of rice. A total of ₦159,000 of value was added by the farmers to the rice value chain. The value added is mainly composed of return to management, which constituted more than 75 percent payment for labour and depreciation (table 4.17).

4.3.2 Paddy Marketers

The costs incurred and revenue received by paddy marketers for assembling paddy and making it available to other chain actors are shown in table 4.18. The costs items, apart from the cost of acquisition of the paddy, were mainly payment of one charge or another. They include cost of storage, transportation, loading and off-loading, union dues and local government taxes. The storage cost is charged for storing paddy till the next market day. The fee charged was ₦10 per day per bag. Paddy assembler moved from one producing cluster to another buying paddy in small quantities, which is cleaned, re-bagged and stored till the next market day. Paddy is stored on the average for a period of five days.

Another cost similar to storage cost paid by the marketers was the market stall, or temporary storage cost. This was also ₦10 per bag per day. But at least one day's storage charged is paid on every bag brought to the market. Where the merchandise was not sold on that market day, then the ₦10 per bag per day is applied. Bagging is usually associated with some cleaning and winnowing activities. The cost includes cost of propylene bag, bagging and sowing. This is different from loading and off-loading charges, which has to do with putting the bags on and off the lorry. It is also different from the cost of transportation which is paid directly to the driver of the vehicle or motorcycle. Other costs incurred by the marketers include taxes levied by the local government authority, called local government revenue, union dues and commission for agents and the so-called temporary storage levy. In spite of all these array of costs, paddy marketing was still found to be a profitable undertaking in the study area. The marketer can make up to a gross margin of ₦400 and net margin of ₦50 per every bag and Kilogram sold respectively. This findings of the profitability of paddy rice marketing is similar to that of NRDS, (2009) and Cadoni and Angelucci (2013).

Table 4.18: Marketing Cost of a bag and Kilogram of paddy

No	Items of Cost and Returns	₦/Bag	₦/Kg	%
1	Purchase price of paddy	4,550.00	60.67	92.86
2	Storage cost of paddy	50.00	0.67	1.02
3	Bagging	100.00	1.33	2.04

4	Transportation cost	100.00	1.33	2.04
5	Loading and off-loading cost	30.00	0.40	0.61
6	LGA Tax	20.00	0.27	0.41
7	Union fees	15.00	0.20	0.31
8	Middlemen charges	25.00	0.33	0.51
9	Temporary market storage	10.00	0.13	0.20
10	Total Marketing cost	4,900.00	65.33	100.00
11	Purchase price of paddy	4,550.00	60.67	
12	Selling price of paddy	4,950.00	66.00	
13	Gross Marketing Margin	400.00	5.33	
14	Net Marketing Margin	50.00	0.67	
15	Value added	400	5.33	

Source: Survey data 2014

4.3.3 Parboilers

Parboilers in the survey area, unlike the marketers, were mainly service providers. They parboil paddy for fee, which constitute the major portion of their revenue. There were very few of them who purchase paddy, processed and sell milled rice. However most of them merely provide the parboiling service for a fee. The costs and returns of parboiling in the survey area are presented in table 4.19.The items of cost include variable inputs and fixed inputs. The variable inputs include; water, fuel wood and labour. The fixed inputs item was mainly depreciation of parboiling equipments and tools which included; parboiling equipments, washing basins and bowls, sieves, drying mats brooms and sticks. There was total absence of drying slabs, either owned by the community or by individuals.

Table 4.19: Costs and Returns of Parboiling a bag of Paddy

No	Items of Cost and Returns		₦/Bag	₦/Kg	%
1	**Cost**				
2	**Variable costs**				
	i	Fuel wood	150	2.00	51.28
	ii	Water	100	1.33	34.19
	iii	labour	25	0.33	8.55
	iv	**Total Variable cost**	275	3.67	94.02
3	**Fixed cost**				
	i	Depreciation of Equipments	17.5	0.23	5.98
	ii	**Total Fixed cost**	17.5	0.23	5.98
4	**Total cost**		**292.5**	3.90	100.00
5	**Revenue**				
	i	**Parboiling fee**	**350**	4.67	
	ii	**Total Revenue**	**350**	4.67	
6	**Gross Margin**		75	1.33	
7	**Net Margin**		**57.5**	1.1	
8	**Value Added**		**75**	1.67	

Source: Survey data 2014

About ₦300 was spent on parboiling a bag of paddy. The revenue realised from the operation was ₦350. Thus about ₦50 was realised as profit. Variable cost constituted the major component of the total cost of parboiling. Wood and water were the two most important material inputs in the parboiling. The fixed cost component was not a major constituent of the major cost. However, parboiling is the most risky business along the rice value chain. The parboilers run the risk of over-cooking the paddy, especially where drums without a false bottom are used. Overcooked and unevenly dried, soggy grains get more easily damaged and broken in the milling process. This type of rice is not accepted by clients and where it happened, the parboiler had to refund the cost of the paddy back to the client. PropCom (2012) found similar result in the area. They also reported that, as a result of some interventions they carried out, parboilers started to get at least ₦8 more per kg of improved quality local rice. Where the parboilers extended the service to include trading it stretched their range of profitability. The parboilers got on an average NGN 27,000 of profit per month from the trading compared to only NGN 3,000 per month from contract parboiling.

4.3.4 Millers

The cost of rice milling like is composed of both variable and fixed costs. The items of cost under the variable inputs consisted of electricity or diesel, water, lubricants, cost of maintenance and spare parts and labour provided by mill operators and other assistants. Fixed cost in rice consisted of costs of depreciation charges on machines and equipments. The cost and return of producing one bag of milled rice is presented in table 4.20.Variable cost constituted more than 97 percent of the total cost of milling in electric and diesel powered mills. In diesel powered mills cost of diesel constituted more than 60 percent of the total cost of production.

The total cost of milling was higher for the diesel powered machines, so also is the fee charged for milling. Even though the revenue obtained under the diesel powered mills were higher than the electric powered, the cost of operation was also much higher and as such the profit margin was higher under the electric powered mill. The value addition was also higher under the electric powered mills.

Table 4.20: Cost and Returns of Milling (₦/I00kg milled rice)

N0	**Cost And Returns**	Diesel Mills	%	Electric Mills	%
1.0	**Variable costs**	₦/I00kg		₦/I00kg	
1.1	Material input				

	i	Diesel	120.00	64.52	0.00	0.00
	ii	Electricity	0.00	0.00	4.50	7.06
	iii	Water	5.00	2.69	5.00	1.92
	iv	Lubricants	3.00	1.61	3.00	4.71
	v	Spare parts	3.50	1.88	2.00	3.14
	vi	**Sub-Total**	**131.50**	**70.70**	**14.50**	**16.84**
1.2	**Labour Charges**					
	i	Machine operator	35.00	18.82	35.00	54.95
	ii	Operator assistant	15.00	8.06	10.00	15.70
	iii	Winnowing and cleaning	2.50	1.34	2.50	3.92
	iv	**Sub-Total**	**52.50**	**28.23**	**47.50**	**74.57**
1.3	**Total Variable cost**		**184.00**	**98.92**	**62.00**	**97.33**
2.0	**Fixed cost**					
2.1	Depreciation on building		0.50	0.27	0.50	0.78
2.2	Depreciation on equipment		1.50	0.81	1.20	1.88
2.3	**Total Fixed cost**		**2.00**	**1.08**	**1.70**	**2.67**
3.0	**Total cost**		**186.00**	**100.00**	**63.70**	**100.00**
4.0	**Revenue**					
4.1	Fees receive from Milling		350.00		260.00	
4.2	Sales or rice husk		5.00		5.00	
5.0	**Total Revenue**		**355.00**		**265.00**	
6.0	**Gross Return**		**171.00**		**203.00**	
7.0	**Net profit**		**169.00**		**201.30**	
8.0	Value added		223.50		250.50	

Source: Survey data 2014

4.4. Problems of Rice Production in the Study Area

Rice production and processing in the study area did not only contribute to the country's food security, but was also contributed to income and rural employment generation, poverty reduction, conservation of biodiversity, as well as, generating revenue for the local authorities. In spite of this spectacular contribution, it was observed that rice production and processing in the study area was constrained by a number of edaphic and socio-economic factors. These constraints tended to hinder the chain actors from achieving their full potentials. Some of these factors and their impact on rice production and processing are discussed in relation to some selected major actors in this section.

4.4.1 Farmers

Rice production in the study area is typical of the traditional rice-cropping system, where small scale farmers use low quantity and quality modern inputs in combination with mixed varieties of home-grown seeds, which eventually led to low level of quality paddy and hence the low price it attracted. Under this scenario it was not surprising therefore for farmers to complain of high cost of inputs, especially fertilizer and the difficulty in procuring it in the appropriate amount at the right time (table 4.21).Farmers also complained of low price of paddy received over time. Price of paddy rice, according to them, has remained virtually stable but low compared to the prices of production inputs such as fertilizer, pesticides and seeds. As pointed out earlier this was connected to the low quality paddy they produced. They also complained about high cost of marketing, which appeared to be related to high cost of transportation and storage. These were also related to the poor condition of rural roads and lack storage infrastructure at cottage, as well as, at the market level. Other challenges include lack of irrigation facilities, poor pests and disease management and lack of access to institutional credit facilities. These findings were similar to that of Erenstein et-al (2003) and Akinwumi (2012).

Table 4.21: Problems Faced by Rice Farmers, in the Study Area

No	Major Constraints	LGAs					
		Bunkure		**G/Mallam**		**Kura**	
		Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
1	Low price of rice	34	30.63	29	32.96	26	22.61
2	High cost of Fertilizer	22	19.82	19	21.59	31	26.96
3	High pest incidence	8	7.21	2	2.27	7	6.09
4	High interest rate	7	6.31	11	12.5	15	13.04
5	High cost of Marketing	16	14.41	6	6.82	12	10.44
6	Lack of Storage facilities	12	10.81	10	11.36	13	11.3
7	High cost of Transportation	9	8.11	5	5.68	7	6.09
8	Labour shortage	2	1.8	4	4.55	2	1.74
9	Irrigation water shortage	1	0.9	2	2.27	2	1.74
10	**Total**	**111**	**100**	**88**	**100**	**115**	**100**

4.4.2 Marketers

Marketers of paddy and milled rice indicated that limited access to credit, high cost of marketing and shortage of labour were the major constraints confronting them. High cost of marketing was similar to what farmers complained about. In addition to the high cost of marketing they also complained about labour shortage and its attendant high cost and lack price information. Although labour shortage was the least of the five problems mentioned by the marketers, it was pointer to the low mechanization on rice farms and the heavy reliance on manual labor to carry out all farm operations. Labor cost in the irrigated area was driven by opportunity costs of labor (hired) in alternative jobs in dry season activities in the irrigated area. There is therefore the urgent need to introduce appropriate mechanization in the irrigated area. Daramola (2005) found similar result. Although the problem of lack of market information was mentioned by the marketers it appeared its consequence might be more devastating on the famers as it creates an unequal playing field between the marketers and the farmers. This negatively affects the terms of trade for small holder farmers and raises market transaction costs.

Table 4.22: Problems Faced by Rice marketers in the Study Area

No	Major Constraints	LGAs					
		Bunkure		G/Mallam		Kura	
		Freq.	%	Freq.	%	Freq.	%
1	Inadequate credit facilities	16	32.65	13	21.67	21	38.89
2	High Marketing cost	12	24.49	17	28.33	11	20.37
3	Lack of price information	9	18.37	11	18.33	13	24.07
4	High cost of Transportation	10	20.41	16	26.67	7	12.96
5	Labour shortage	2	4.08	3	5	2	3.71
6	**Total**	**49**	**100**	**60**	**100**	**54**	**100**

4.4.3 Millers

Low level and erratic supply of electricity with its attendant high cost was reported a major constraint to the millers (Table 4.23). Other constraints mentioned by the millers include lack of access to credit, poor and inadequate storage facilities, lack of adequate supply of paddy and high cost of labour and transportation. One of the problems observed was the use of volume, such as bags instead of weights (kg or tons). There was also a complete absence of milled rice quality control along the value chain.

Table 4.23: Problems Faced by Millers in the Study Area

No	Major Constraints	LGAs					
		Bunkure		**G/Mallam**		**Kura**	
		Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
1	Lack of Electricity	19	27.14	23	29.11	27	36
2	Inadequate credit facilities	16	22.86	10	12.66	13	17.33
3	Low supply of paddy	8	11.43	9	11.39	12	16
4	Storage problems	11	15.71	16	20.25	2	2.67
5	Transportation Problems	3	4.29	1	1.27	5	6.67
6	Labour shortage	1	1.43	3	3.8	3	4
7	High cost of spare parts	12	17.14	17	21.52	13	17.33
8	**Total**	**70**	**100**	**79**	**100**	**75**	**100**

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The major rice value chain actors identified include; inputs dealers, farmers, paddy traders, parboilers, millers, milled rice marketers and consumers. Results of the survey showed that all the input dealers interviewed were male, fairly well educated with an average age of 44 years. More than 70 percent of them had primary education and about 27 percent had some form of post- secondary education. The major inputs sold included fertilizer, seeds, agrochemicals and water pumps.

Majority of the farmers were men, within the productive ages of 45 to 50 years and 98 per cent of them were married.The mean family size was 9 persons per family with an average of two families per household. About 60 percent of them had post-secondary education.More than 95 percent of the rice producers were literate and about70 percent of them belong to farmer based organization. The average farm holding in the area was 2.6 hectares and more than half of it was devoted to rice production.

Parboiling business is dominated by women (85%) in the area. Most of the women were in their mid-forties and were all married. More than 90 percent of them had put in about fifteen years in parboiling. Only about 20 percent of the women were educated up to primary school level. Most of the women were taught the art of parboiling at an early age by their parent.

Rice milling in Nigeria is a cottage industry, dominated by medium size workshops with a processing capacity of 150 to 300 kg/hr. The millers were generally male, married with an average age of 45 years. More than half of them had secondary education and about 7 percent had tertiary education. Majority (60%) of the millers were involved in farming in addition to milling. All the marketers interviewed were male with an average age of 47 years. The marketers had lower formal education compared to millers. Less than 50 percent of the marketers had primary education. Unlike the paddy sellers about 7 per cent of the milled rice marketers had secondary education.

The consumers consisted of households and institutions such as; hotels, schools and restaurants who patronize local rice. Fourteen variables that influenced consumer preference were identified. Nine out of the fourteen variables were found to be significant. These were; price, swelling capacity, taste, stickness, texture, colour, level of impurities, grain size and ease of preparation. Price differential between imported and domestic rice appeared to be the most important factor.

The flow of rice along the value chain was estimated using information collected from primary and secondary sources. A total of 35, 627 farmers, 25 irrigation sectors and 30 Water User Association (WUA) were identified in the study area. Two types of farmers, small and large scale, were identified. Small scale famers constituted more than 99 percent of the population and contributed about 94 percent of rice production. An estimated 189,630 tons of paddy was produced in the study area. More than 80 percent is sold to raise needed income. About 50 percent is sold immediately after harvest and the remaining 30 percent is sold later in the year, close the planting season, to finance the next year's rice crop. About two percent of the production is kept as seed. Less than 10 percent of the total rice output is utilized in the house for consumption. The bulk of the paddy is sold to the wholesalers through commission agents and rural assemblers. Majority of the paddy is moved to the processors and some moved out of the project area as paddy. But more than 70 percent is sold as milled rice.

A total of about ₦75,000 was expended by famers in cultivating one hectare of rice. This was approximately equivalent to about ₦23 per kilogram of paddy, which was sold at about ₦ 60:00.About 49 percent of the total cost of production was from purchases of material inputs such as seeds, fertilizer and pesticides. Fertilizer contributed about 30 percent of the total cost of rice production. Labour charges; harvesting, land preparation, planting and weeding constituted less than half (49 %) of the total cost of production. Depreciation constituted less than 2 per cent of the cost.

However, despite the low productivity, rice production was found to be a profitable venture in the study area. The total revenue from one hectare of rice production was about ₦200,000 out of which ₦120,000 was realized as profit. The net-return of a kilogram of paddy was about ₦37:00. The costs incurred by paddy marketers included cost of storage, transportation, union dues, local government taxes, loading and off-loading. The storage cost was charged for storing paddy till the next market day. The fee charged was ₦10 per day per bag. Another cost similar to storage cost paid by the marketers was the market stall, or temporary storage cost. This was also ₦10 per bag per day. Paddy marketing was found to be a profitable undertaking in the study area. The marketer can make up to N400 and net margin of ₦50 per every bag and Kilogram sold respectively.

Parboilers in the survey area were mainly service providers. They parboil paddy for fee, which constitute the major portion of their revenue. About ₦300 was spent on parboiling a bag of paddy. The revenue realized from the operation was ₦350. Thus about ₦50 was realized as profit.

The cost of rice milling is composed of both variable and fixed costs. The items of cost under the variable inputs consisted of electricity or diesel, water, lubricants, cost of maintenance and spare parts and labour provided by mill operators and other assistants. Fixed cost in rice milling consisted of costs of depreciation charges on machines and equipment. Variable cost constituted more than 97 percent of the total cost of milling in electric and diesel powered mills. In diesel powered mills cost of diesel constituted more than 60 percent of the total cost of production.

Rice production in the study area is typical of the traditional rice-cropping system in Nigeria, where small scale farmers use low quantity and quality modern inputs in combination with mixed varieties of home-grown seeds, which eventually led to low level of quality paddy and hence the low price it attracted. All the same farmers complained of high cost of inputs, especially fertilizer and the difficulty in procuring it in the appropriate amount at the right time. They also complained of low price of paddy received over time.

Marketers of paddy and milled rice indicated that limited access to credit, high cost of marketing and shortage of labour were the major constraints confronting them. Low level and erratic supply of electricity with its attendant high cost was reported as a major constraint to the millers. Other constraints included lack of access to credit, poor and inadequate storage facilities, lack of adequate supply of paddy and high cost of labour and transportation. Another problem observed, but not mentioned by any actor, was the use of volume, such as bags instead of weights (kg or tons) in all market transactions along the value chain. In addition to that there was also a complete absence of any form of standard or quality control mechanism to guide market transactions along the entire value chain.

5.2 Conclusion

i. Rice is first and foremost a cash crop for farmers in the study area. As such rice value chain promotion and development can be used to generate income for farmers and reduce the level of poverty in the rural communities.

ii. The major rice value chain actors in the study area are input dealers (seed, fertilizer, pesticide sellers, tractor hire service providers), rice producers, parboilers, millers, paddy and parboiled rice marketers.

iii. The input dealers were the youngest among the rice value chain actors. Parboilers were the least educated and millers had the highest number of educated members. Rice producers are small-holders, with an average land holding of 2.6 ha of which 1.3 ha was devoted to rice production. They are literate and belong to farmer based organization which is an indication of the potentials to adopt new technology.

iv. Parboiling business was dominated by women. Rice milling in Nigeria is a cottage industry, dominated by medium size workshops with a processing capacity of 150 to 300 kg/hr.

v. Material inputs, seed, fertilizer and pesticides constituted about half of the total cost of rice production. Fertilizer constituted about one third of the total cost of production. Labour charges also constituted 49 per cent the total cost and depreciation constituted less than two per cent of the cost.

vi. Rice production was profitable in the study area. The total revenue from one of hectare of rice was ₦200,000 out of which ₦120,000 was realized as profit. The marketer can make up to ₦400 and net margin of ₦50 from every bag and kilogram sold respectively. Parboilers obtained a profit of ₦50 on every bag of paddy. However the returns are low relative to the investments by the actors.

vii. Low price of paddy, limited access to credit, shortage of labour, erratic supply of electricity, high cost of fertilizer and marketing were the major constraint to rice value chain in the study area.

5.3 Recommendations

i. The survey has highlighted that there were positive returns to all the rice value chain actors, but the returns appeared to be relatively small compared the investment made by the actors. There is therefore the need to improve the accessibility of technology to the major actors so as to enhance productivity and reduce production costs. This could be done through a public-private partnership where the business development association led by non-governmental organization to take a leading role in the arrangement.

ii. In addition to that rice activities along the chain were labour intensive. Labour charges represent a large proportion of the cost of production to all the actors. All the major actors complained of labour shortage and its attendant high cost during peak period of labour demand. Improving labour productivity through the use of labour-saving technologies and improved management practices is highly recommended.

iii. Majority of the farmers have adopted the use of external inputs such as fertilizer, seed and herbicides but the returns obtained from the use of the inputs was very low as indicated by the low yield. There is substantial scope for increasing yields and enhancing input use efficiency. Therefore there is the need for improved access to extension services and in particular the need for training on best practices in rice production and processing.

iv. The local government councils and community leaders should jointly initiate an adult literacy programs to assist women acquire some form of education to allow them lead an enlightened and educated life. Thereafter improved parboiling practices and business arrangements should be introduced to them.

v. Rice milling in Nigeria is a cottage industry, dominated by medium size workshops. The millers should be introduced to joint-venture projects, where resources can be pooled to acquire large processing plants to manage jointly as business partners. This will lead to improved quality, reduced cost and improved earnings.

vi. Marketers should also be facilitated to reap the benefit of their business associations. This could be arranged by development agents and NGOs to encourage joint marketing activities and ownership of common assets, such as drying slabs and warehouses. This would improve quality, economy of scale and improve earnings.

vii. Since price is the most important variable that influenced consumer preference, attention should be focused on efforts to reduce cost of doing business along the value chain, by ensuring that all value chain participants contribute to value addition to the commodity.

viii. Depreciation constituted less than 2 per cent of the cost of rice production in the area. Access to credit for acquisition of assets such as machinery and appropriate equipments should be improved.

5.4 Contributions of the study to Knowledge

i. The study found that input dealers are relatively young, with an average age of 44 years. In addition to that it appears they started the business at an early age, as the average length of time spent in the business by most of them was about 15 years.

ii. The study discovered that the average farm holding in the area was 2.6 hectares and more than half of it is devoted to rice production in all the three local government areas. Thus majority of the farmers in the area are small scale farmers. The classification of farms into either large or small scale depends on the agricultural system settings, the geographical area and to a large extent the type of enterprise.

iii. The study discovered that there are 35, 627 farmers, 25 irrigation sectors and 30 Water User Association (WUA) in the study area. Two types of farmers, small and large scale, were identified. Small scale famers constituted more than 99% of the farming population in KRIP and contributed about 94% of rice production in the area. Large scale farmers constituted less than one percent of the population, but contributed more than 6% of the total rice output in the area

iv. It was found that storage cost was charged for storing paddy till the next market day. The fee charged was ₦10 per day per bag. However, the marketer can make up to a gross margin of ₦400 and net margin of ₦50 per bag and kilogram sold respectively.

v. The study further found that ₦300 was spent on parboiling a bag of paddy. The revenue realized from the operation was ₦350. Thus only ₦50 was realized as profit. However where the parboilers extended their service to include trading they can earn an average of ₦27,000 profit per month compared to only ₦ 3,000 per month from contract parboiling.

vi. The study also revealed that the cost and return of producing one bag of milled rice. Variable cost constituted more than 97% of the total cost of milling in electric and diesel powered mills. In diesel powered mills cost of diesel constituted more than 60% of the total cost of production.

5.5 Suggestions for Further Study

From the findings and conclusion of this study, the following suggestions further studies are made:

i. There is need to conduct a Strength, Weakness, Opportunities and Threats (SWOT) analysis of the rice value chain actors. This will further reveal areas that needed to be strengthened and opportunities to be harnessed.

ii. There is need to conduct impact assessment study on the rice value chain stakeholders.

iii. There is the need to conduct studies in rice value chain designed to estimate the contribution of the value chain in job creation and income generation.

iv. Value chain development works better when there is a good two-way flow of information between actors. There is the need therefore to carry out a study that will identify the key information required by actors and its rate of flow.

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APPENDIX 1: QUESTIONAIRES

1. KRIP RICE VALUE CHAIN ANALYSIS 121212

FARMERS QUESTIONNAIRE

A. Identification of the interview

1. Questionnaire number________ 2. Enumerator name: __________________

3. Interview date: ____/_____/____ 4. Reviewed by:______________________

5. Date of review: ___/_____/____ 6. LGA :____________________________ 7. Town :____________________ 8. Address (location):__________________

_______________________________ 9. Telephone number:__________________

B. **Background Information of Respondent**

1. Name: ___________________________ 2. Gender ________________

3. Age_____________________ 4. Major Occupation ___________________

5. Other Occupations; (i) __________________ (ii) _____________________

6. Formal Education (tick): (i) Primary (ii) Secondary

(iii) Post Secondary (iv) None

7. Farms Size _______________ Area devoted to Rice___________________

8. Family Size (total) ____

C. Affiliation to Association

9. Do you belong to any association? Yes __________ No ____________

10. If yes list three most important associations you belong to

(i) _______________ (ii) ________________ (iii) ___________________

11. What is your position in the association (a) Executive_____ (b) Member ___

12. How long have you been a member?___________________________________

13. How old is the association____

14 What benefits do you derive from the association?

i. ____

ii____

D. Rice Production

15. What is the size of your Rice farm?_____________________________________
16. What variety do you plant? ____
17. What yield did you obtain last season___________________________________
18. How was the produce dispose of
i) Home consumption____
ii) Zakka____
iii) Gift____
iv) Sale____

19. What are the 3 most important problems you face in Rice production

i) ____

ii) ____

v) ____

20. What was your cost of production last season?

No	Items of cost and Return	Units of	Quantity	Unit	Total Cost

		measure		Price	
a.	Inputs used				
	Seeds				
	Fertilizer				
	Pesticides				
	Insecticide				
	Water				
	Others				
b.	Labour				
	Land preparation				
	Land Clearing				
	Cleaning				
	Plowing				
	Harrowing				
	Ridging				
	Banding				
	others				
c.	Planting				
	Transplanting				
	First Weeding				
	Second Weeding				
	Third weeding				
	Fertilizer application				
	Insecticide application				
	Herbicide application				
	Bird scaring				
	Other cost;				
	i) ________________________				
	ii) _______________________				
	iii) ______________________				
	iv) ______________________				
	REVENUE				
	Rice yield				
	Quantity sold				
	Prices				

21. Depreciation schedule of fixed items

No	Items	Lifespan (years)	Estimated value	Salvage value	Depreciation
	Hoe				

C. MARKETING OF RICE

21. For how long do you store paddy before selling?__________________________

22. Where do you store it?____

23. If hired how much do you pay? ____

24. Who own the store? ____

25. How do you move rice from the village to the store? _______________________

26. How do you move paddy from store to village market? _____________________

27. Which markets do you take your produce to? _____________________________

28. How far are they from your village? ____________________________________

29. How much do you pay per bag from village to the market?_________________

30. Who are the major suppliers to the market? ______________________________

31. Who are the buyers? ____

32. Are there middlemen in the market? ____________________________________

    a. What role do they play in the market? ___________________________

    b. Do you think the middlemen are necessary? ________________________

33. What is the relationship between Buyers and Sellers? ______________________

____

34. What are the most important Rice markets in Kano? _______________________

35. What are the various fees charged for processing (parboiling, milling etc)

OPERATION	CHARGE

36. How are the fees determined?____

____

37. Who determine the fees? ____

38. What are the various fees you pay before selling your rice? (distinguish between paddy and milled rice)

List

____

____

____

____

39. What problems do you face in marketing rice?

i) ____

ii) ____

vi) ____

2. GUIDELINES FOR ASSOCIATION FOCUS GROUP DISCUSSION.

1. TYPES OF ASSOCIATIONS IN THE CLUSTER

a. Name and address of association
b. Is it registered? When? What is the registration number
c. When was the association formed?
d. What is the mode of operation?
e. What is their membership structure?
f. What determines who becomes a member?
g. What is the governance structure?
h. Names and address of members

2. SERVICES RENDERED BY ASSOCIATIONS

a. What services do you render to your members?

b. Are they paid services or are they free?

3. ADVOCACY

a. Have you embarked on any form of advocacy in the past?

b. If yes, what was the issue in question and how was it addressed?

c. What was the outcome?

4. CAPACITY BUILDING

a. Have you benefited from any form of capacity building in the past?

b. If yes, what are the areas and how has the training benefited your members?

c. What areas of their activity would they like to receive more training on?

5. RELATIONSHIPS BEWEEN ORGANIZATIONS

a. What is your relationship with other organizations in the clusters?

6. FINANCIAL SERVICES

a. What are the sources and types of financial services available to your association in the clusters?

b. Have you benefited either collectively or as individual members?

c. How many of them have benefited and what is the repayment rate?

7. **VARIETIES**

a. What are the major varieties of rice grown

b. what is the estimated quantities produced..

8. MOVEMENT OF PADDY

a. How does paddy move from the farm to the village stores?

b. Who owns these stores?

c. How long is the paddy held by the farmers before disposal?

d. How does paddy move from the farmers’ stores to the village market?

1. BUYING AND SELLING

a. Who are the major suppliers and who are the major buyers?

b. What is the relationship between these players?

c. Are there middlemen in the markets?

d. What roles do they play in facilitating transactions between buyers and sellers?

10. FEES CHARGED

a. What are the various fees charged by parboilers and millers?

b. How are these fees determined? (Provide a general overview)?

11. TRANSACTION COSTS

a. List the various transactions (e.g. transportation, handling and storage etc.) and their associated costs involved in the movement of paddy or rice from the clusters to the consumption markets?

b. Who determines these fees and how are they paid and to whom? (Provide a general overview).

12. TRANSPORTAITON

a. What are the main modes of transportation used for hauling rice?

b. What is the ownership structure like?

13. MARKET

a. What is the size of the market operating in the cluster?

b. Is it a daily or weekly market?

c. What types of infrastructure are available in the market?

d. Who owns these infrastructures?

e. What types of fees are paid for accessing the market?

f. Who determined those fees and who are they paid to?

14. UNITS OF MEASUREMENTS

a. What are the main units of measurement used in the market and who determines what the measure will be?

b. Is the mudu standardized in the area?

c. is the standard weight of a bag?

d. Who determines how many mudus make a bag?

e. How many kilograms of rice does a mudu contain?

f. Is rice sold by the bag or the mudu?

15. UNIQUENESS

a. What are the attributes that makes this cluster different from others.

KRIP RICE VALUE CHAIN ANALYSIS 121212

MARKETER QUESTIONNAIRE

A. Identification of the interview

1. Questionnaire number________ 2. Enumerator name: _________________

3. Interview date: ____/_____/____ 4. LGA :___________________________ 5. Town :______________________ 6. Address (location):_________________

8. Telephone number:____

B. BACKGROUND INFORMATION

1. Name……………………………..............2. Gender…………………………..

3. Age………………………….4.MajorOccupation………………………………

5. Other Occupations; (i)…..…………………(ii)…………………………………

6. Formal Education (tick); i. Primary ii. Secondary iii. Post Secondary iii. None

7. Size of business (Quantity of rice (PR/MR) of …………………………………

8. Family Size (total)………………………………………………………………

C. AFFILIATION TOASSOCIATION

9. Do you belong to any association Yes ……. No …………………

10. If yes list three most important associations you belong to

i……………………….ii………………………iii……………………………..

11. What is your position in the association? (a)Executive (b) Member

12. How long have you been a member………………………………………

13. How old is the association………………………………………………….

14 What benefits do you derive from the association?

i. …………………………………………………………………

ii ………………………………………………………………………

D. **MARKETING OF RICE**

15. Are you a paddy ☐ milled rice seller ☐ or both ☐ (Tick as appropriate)

16. If paddy seller answer these questions

17. What quantity do you handle per season

18. Briefly describe how you purchase your paddy---

----

19. For how long do you store paddy before selling…………………………………

20. Where do you store it……………………………………………………………

21. If hired how much do you pay per bag or per unit area and time (specify)…………………………………………………………………………

22. Who own the store………………………………………………………………

23. How do you move rice from the village to the store……………………………

24. How do you move paddy from store to village market…………………………………………………………………………………

25. Which markets do you take your produce to ……………………………………

26. How far are they from your village………………………………………………

27. How much do you pay per bag from village to the market………………………

28. Who are the major suppliers to the market……………………………………

29. Who are the buyers………………………………………………………………

30. Who are the major actors in the market and their roles …………………………

Actors………………………………Roles…………………………………….

………
…….

31. What is the relationship between Buyers and Sellers……………………………

……
………

32. What is the estimated volume of paddy rice that is moved to Kano markets

………………………………………………………………………………

33. What is the estimated volume of milled rice moved to Kano market.

………………………………………………………………………………

34. What is the estimated volume of paddy that is brought into the cluster……………………………………………………………………………….

35. What is the estimated volume of milled rice moved into the cluster……………………………………………………………………………….

36. How is it moved………………………………………………………………

37. What are your most important Rice markets in Kano……………………………

…………………………………………………………………………………

………………………………………………………………………………

38. What are the various fees charged for processing (parboiling, milling etc)

OPERATION	CHARGE

39. How are the fees determined…………………………………………………

40. Who determines the fees……………………………………………………

41. What the transaction cost involved in moving rice from the cluster to Kano markets.

42. What are the various fees you pay before selling your rice (distinguish between paddy and milled rice)

List

……………………………………………………………………………….

……………………………………………………………………………….

……………………………………………………………………………….

43. What problems do you face in marketing rice

i……………………………………………………………………………………….

ii………………………………………………………………………………………

iii……………………………………………………………………………………..

PARBOILERS QUESTIONNAIRE

A. IDENTIFICATION

i. Name of Cluster Assistant …………………………………………………….

ii Name of Facilitator…………………………iii. Date**………………**……….

iii. State……………………………… iv. LGA……………..………………………

v. Cluster…………………………….v. Village……………………………………

B. BACKGROUND INFORMATION OF RESPONDENT

1. Name……………………….......................... 2. Gender……………………

3. Age…………………………4.MajorOccupation………………………………

5. Other Occupations; (i)…...………………………(ii)……………………………

6. Formal Education (tick); i. Primary ii. Secondary iii. Post Secondary iii. None

7. Farms Size …………………… Area devoted to Rice………………………

8. Family Size (total)…………. ……………………………………………......

C. AFFILIATION TOASSOCIATION

9. Do you belong to any association Yes No

10. If yes list three most important associations you belong to

i…………………………ii………………………iii…………………………

11. What is your position in the association a) Executive (b) Member

12. How long have you been a member……………………………………………

13. How old is the association…………………………………………………

14 What benefits do you derive from the association?

i. …………………………………………………………………………

ii ……………………………………………………………………………

D. MARKETING OF RICE

15. For how long is paddy stored before selling…………………………………

16. Where is stored …………………………………………………………...

17. If hired how much do you pay……………………………………………….

18. Who own the store……………………………………………………………….

19. How rice moved from the village to the store………………………………..

20. How do you move paddy from store to village market…………………………

21. Which markets do you take your produce to …………………………………..

22. How far are they from your village…………………………………………..

23. How much do you pay per bag from village to the market……………………..

24. Who are the major suppliers to the market……………………………………

25. Who are the buyers……………………………………………………………

26. Are there middlemen in the market……………………………………………

    a. What role do they play in the market……………………………………
    b. Do you think the middlemen are necessary……………………………

27. What is the relationship between Buyers and Sellers……………………………

    ……
    …………………………………

28. What are the most important Rice markets in Kano……
………
………
…………………

29. What are the various fees charged for processing (perboiling, milling etc)

OPERATION	CHARGE

30. How are the fees determined…………………………………………………

………………………………………………………………………………………

31. Who determine the fees…………………………………………………………

……………………………………………………………………………………….

32. What are the various fees you pay before selling your rice (distinguish between paddy and milled rice)

List

-

-

-

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33. What problems do you face in

i……………………………………………………………………………

ii……………………………………………………………………………

iii……………………………………………………………………………

KRIP RICE VALUE CHAIN ANALYSIS (121212)

PROCESSOR (MILLER) QUESTIONAIRE

A. Identification of the interview

1. Questionnaire number___________ 2.. Interview date: _____/______/_____

3. Name of Respondents: ____

4. Address (location):____

5. Town :_________________________________ 6. LGA :____________________

7. Telephone number:____

B. General information of respondents

1. Gender (M/F). 2. Age-------- 3. How long have you been in rice milling………

4. Educational level ---------------- **P= Primary, S =Secondary,**

T = Tertiary, Q = Quranic

C. General information on the owner of the workshop.

1. Are you engaged in activities other than milling? No/Yes *if Yes* 2.*Which type of activity?* Farming, Trading , Transport, Salaried work, Others (specify):_____

____

3. Which activity is your main source of income?_____________________________

4. Do you belong to a rice miller association? Yes/No

5. If No why?____

6. If yes, what is the name of the association?:______________________________

7. What benefits do you derive from the association?
(i).____

(ii)____

8. Are you satisfied with what the association is providing? Yes/No

9. If No, list three major functions you would want the association to render to the members

   (i).____

   (ii)____

   (iii)____

10. For how long have you been milling rice?______________________________

11. How did you learn rice milling technique? ______________________________

12. What type of mill do you operate?_____________________________________

13. Where is the source of your milling equipment? _________________________

14. Is there any peak and none-peak period in rice milling? Yes [ ] No [ ]

15. If yes, when are the peak and off-peak periods and duration (in Months)?

(a) Peak period ____

(b) Off-peak period____

16. What is the capacity of the mill you operate? _____________________________

17. What quantity of paddy do you mill in a day? ____________________________

18. How many times do you pass the paddy in the machine during milling? _______

19. How many days of the week do you mill rice? ____________________________

20. How many months of the year do you mill rice?___________________________

21. Do you use the mill to process other commodities?_________________________

22. What other commodities do you process? (a) Maize [ ] (b) Wheat [ ]

(c) Others____

40. Did you change your milling machine in the last five years? Yes [ ] No [ ]

41. If changed, give reasons____

____

____

D. Milling capacity

1 Estimating milling capacity and paddy to mill conversion rate

i. Identify different types of machine owned by miller based on power of engine. Fill up the columns for each type of machine

Type of mill by class of power		Number of mills	Processing capacity						Equivalent in paddy or rice		
			Quantity		Time		Paddy or Milled rice		Quantity		Paddy or rice milled
			Amount	Unit	Amount	Unit			Amount	Unit of check N1	
							P/				P/R
							P/R				P/R
							P/R				P/R

Kg, bag Hour Kg, bag

Kwano, Cup	Day	Kwano, Cup

2 Estimation of variation in rice processing capacity utilization across the year

1. Record the month when rice processing activity is at peak, medium or low

Level of activity	J	F	M	A	M	J	J	A	S	O	N	D	Number of hours of operation per day	Volume processed per day		Number of days of operation per week
														Quantity	Unit check Ni	
Peak																
Medium																
Low																
Closed																

D3 Total quantity of rice processed last month__________/_________ of P/R

(quantity) (unit) paddy or milled rice

D4 Total quantity of rice processed last year (2012)?______/___________ of P/R

(quantity) (unit) paddy or milled rice

D5 Do you use the workshop to process any other commodity? Yes/No.

If yes go to D6. If no go to E

D6 Relative importance of the various commodities processed by the workshop

Commodity processed including paddy	Rank by importance		Compare the volume processed to paddy		Share of each product in total volume of product process by the workshop		Estimation of quantity	
							Quantity	Unit check N1

1 = the most important expressed in % or ratio Total = 100%

D7 Are the quantities of paddy processed or milled rice produced recorded in a book? Yes/No

E. Processing operations and techniques

E1 Tasks performed on the paddy before parboiling it

Do you?	If not: why?	If yes:	% of paddy processed

			Equipment used	Description of the method	
Winnow fresh paddy	No/ Yes				
Dry fresh paddy	No/ Yes				
Destone fresh paddy	No/ Yes				

E2 Parboiling

Do you?		If not: why?	If yes:		% of paddy proc.
			Equipment used	Description of the method	
Parboil paddy	No/ Yes			Soaking (hot/cold water, duration) Steaming: Drying (method and duration)	

E3 Milling

Description of the type of equipment used: Horizontal disk, Engelberg., Vertical disk Cono-disk
Do you pass the rice more than one time in the machine? No/Yes If yes, why?

E4 Milled rice destoning/Packing

Do you?		If not: why?	If yes:		% of paddy proc.
			Equipment used	Description of the method	
Destone milled rice	No/Yes				
Do you pack milled rice	No/Yes				

F. Fixed costs

F1 Infrastructures

Type of Asset	Size (Specify)	Year of construction (date)	Year of acquisition (date)	Own/ Rent	Cost (₦)	Source of funding	Improvement made			Useful life (Years)
							Description	Year (date)	Cost (₦)	

F 4.Permanent employees

Type of function	Number	Wages	Base of the wage[1]
Manager			
Operator			
Cashier			
Attendant			
Others (Specify)			

[1]Monthly salary, daily, lump sum.

F 5. Other fixed expenditures

Item	Amount (Naira)	Base /month, /year
Local government taxes		
Loan reimbursement for equipment		
Other--		

G. Variable cost

Operation	input				cost		Cost Estimate based on			
	Category	type	Quantity	Unit	Unit value	total Value	Volume/ Time	If volume Product	Quantity	unit
			Number	Specify	(₦)	(₦)	Numb	Pad/Rice	Numb	Specify
G1 Pre-Parboiling Operation	Labour	Family					V/ T	P/R		
		Hired					V/ T	P/R		
	Energy						V/ T	P/R		
	Lubricant						V/ T	P/R		
	Spare parts						V/ T	P/R		
							V/ T	P/R		
							V/ T	P/R		
G2 Parboiling Operation	Labour	Family					V/ T	P/R		
		Hired					V/ T	P/R		
	Energy						V/ T	P/R		
	Water						V/ T	P/R		
							V/ T	P/R		
							V/ T	P/R		
G3 Milling Operation	Labour	Family					V/ T	P/R		
		Hired					V/ T	P/R		
	Energy						V/ T	P/R		
	Lubricant						V/ T	P/R		
	Spare parts						V/ T	P/R		
	Maintenance						V/ T	P/R		
							V/ T	P/R		

H.1 **Characteristics of paddy suppliers**

Type of sellers	**Importance**	**Origin of the product**		**Place of transaction**	**Average volume per transaction**		**Frequency of purchase**
		Name of location	**Distance (km)**		**Quantity**	**Unit**	

H 2 Do you have specific relations with paddy producers? No/Yes

1. How?		**2. Why?**	
Providing credit	No/Yes	Increase supply of paddy to the mill	No/Yes

H3 Record of the last three transaction to purchase paddy

Item	**Transaction 1**	**Transaction 2**	**Transaction 3**
Date			
Type of paddy purchased/quality grade			
Location of purchase (geographic name)			
Type of location (farm, market, workshop)			
Distance from workshop			
Transport cost for reaching purchasing point			
Type of seller (farmer, co-op, trader)			
Quantity purchased and unit (check N1)			
Unit price (Naira)			
Payment mode (cash, delay, credit)			
If credit or delay payment; interest rate, duration			
Handling cost labor (Naira/			
Bag price (Naira)			
Shipment cost/if own truck – fuel cost (Naira)			

Taxes (Naira)			
Other ……			
Other …..			

H.4 Major Constraint in purchasing paddy

Major constraints	**Rank from the most severe one**	**Problem noted since when**	**Proposed solution**

K7 Are there different types of local rice sold on the market? Yes/No If yes go to k9

K8 If no, could you explain why there are no different types of rice sold on the market?

____

____

K9 If yes, could you indicate the different types of rice sold on the market? Average price

No	NAME OF RICE	PRICE

M6 Is price difference between imported and local rice high enough to justify putting effort in producing local rice of the same quality as imported rice? No/Yes

M7 Could you easily sell local rice of low quality (No/Yes)

M8 Why? ____

Definition of unit measure

N1 Conversion of local unit of measure according to respondent

Name of the unit of measure	**Produce**	**Equivalent in other unit**	
		Quantity	**Unit**
	Paddy/Rice		
	Paddy/Rice		
	Paddy/Rice		
	Paddy/Rice		
	Paddy/Rice		

N2 Conversion of local unit of measure according to the enumerator

Name of the unit of measure	**Produce**	**Equivalent in other unit**	
		Quantity	**Unit**
	Paddy/Rice		
	Paddy/Rice		
	Paddy/Rice		
	Paddy/Rice		

KRIP RICE VALUE CHAIN ANALYSIS (121212)

PROCESSOR (PARBOILER) QUESTIONAIRE

A. Identification of the interview

1. Questionnaire number___________ 2.. Interview date: _____/______/_____

3. Name of Respondent: ___________________________________Gender (M/F)

4. Address (location):____

5. Town :________________6. LGA :___________ 7. Telephone number:______

4. Marital Status: (a)Married [ ](b) Single [ ](c) Divorced [ ](d) Widowed [ ]

5. Age…………………… 6. Household size ………………………………

7. Status of respondent in the household. (a) Household head [ ]
   (b) Member of household [ ]

8. Educational level Quranic [ ] (b) Primary [(c) Secondary [ ] (d)Tertiary [ ] (e) others (specify)…………………………………….

9. Is rice parboiling your major occupation? (a) Yes [ ] (b) No [ ]

10. If No, what is your major occupation? ………………………………………………

11. Is rice parboiling your major source of income?(a) Yes[ ] (b) No [ ]

12. What are your other sources of income?

(a) Trading [ ] (b)Rice Farming [ ] (c) Processing other commodities

(d) Livestock rearing [ ] (e) others (specify)………………………………

13. Are you a member of any group or association? Yes [ ] No [ ]

14. If yes, what is the name of association…………………………………………………………………..

15. What benefit do you derive from the group or association?

………
………………………………

16. How long have you been processing rice? ……………………………………………………………………………………...................

23. Where did you learn the parboiling skill?

(a) Through parents/relations [ ]
(b) Through friends [ ]
(c) Through neighbours [ ]
(d) Others (specify)…………………………………….

28. Who do you process for?

(a) Self [ ] (b) Contract customers [ ] (c) Both [ ] (d) Others……………………………

(B) Rice processing methods

29. What processing technology do you use?

Type of Technology	Type of material	Number	Cost (N)	Source
Traditional pots				
TADCO drums				
NCRI par boiler				
Hanigha type				
Others				

30. Why are you using the above technology? ……………………………………………………………………………………………
………………………………………………………………………………….

31. How much does it cost to start this business?

At the beginning……………………… Presently…………………………….

32. How many bags of paddy do you process per day?

(a) At the beginning of the business……………………………………………

(b) Presently…………………………………………………………………

33. Why did you increase/decrease the quantity processed?.......................................

………
………………………………………………………………………………………………………

34. Is there any peak or off-peak periods in rice parboiling?

Yes [ ] No [ ]

35. If yes, when are the peak and off-peak periods and duration?

(c) Peak period………………………………………….

(d) Off-peak period……………………………………..

36. How many bags do you parboil during:

(b) Peak period………………………………………..
(c) Off-peak period……………………………………..

C. Input-Output characteristics

37. What is the source of your paddy? ………………………………………………………………………………………………………

38. Do you have regular contract customers?

Yes [ ] No [ ]

39. What is the output obtained from a 100kg bag of paddy? (Specify unit of measurement)

………
…………………………………………………..

40. What is the price of rice per unit measure? (specify the unit measure)……………………………………………………………………

41. Please provide information on the following variable cost of parboiling a100kg bag of paddy

Input	**Quantity**	**Unit price**	**Total cost**	**Source**
Paddy				
Energy(specify)				
Water				
Spare parts and maintenance				
Others				

42. Labour input and other services in rice parboiling

Labour and other service providers	Services provided	Number	*Duration (hrs/days)	*Payment/ hr/day/qty processed
Women Female child Male child Millers Transport Others (specify) ……………………… …………………….. ……………………..				

*Specify unit of measurement.

43. Please give the following information on your fixed assets.

Type of equipment	Date purchased(yr)	Purchase value(₦)	Source	Expected lifespan(yrs)	*Capacity
Parboilimg equipment Wooding stove Bowls/basins Drying mats Rakes Others (specify) ………………………… …………………………					

…………………………. ……………………………. …………………………….					

44. Are all these inputs readily available in your area?

(a)Yes [ ] (b) No [ ]

45. What are the major constraints associated with rice Parboiling?

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………
………………………………………………………………………………………

48. Do you consume part of your products at home?

(a)Yes [ ] (b) No [ ]

49. What is the quantity of rice consumed at home? …………...............................

50. What is the quantity of rice sold?...…......

51. Who are your rice customers?

(a)Wholesalers [ ] (b) Retailers [ ] (c) Consumers [ ] (d) Others [ ]

52. When do you normally sell your products?

(a) Immediately after processing [ ]

(b) When the price is at its peak [ ]

(c) When I need money [ ]

(d) When I have a buyer [ ]

(e) Others (specify)……………………………………………………………….

53. Do you take your products to the market?

(a) Yes [ ] (b) No [ ]

54. If yes, which markets do you take your products to?..

55. If No, who is responsible for taking your products to the market?

(a) Husband [ ] (b) Son [ ] (c) Daughter [ ] (d) Relatives [ ] (e) Others………..

56. What is your major means of transportation?

(a)Bus [ ] (b) Motorcycle [ ] (c) Bicycle [ ]
(d) Trekking [ ] (e) Others (specify)…………………………………….

57. Who is responsible for fixing the price of milled rice?

(a) Based on market price [ ]

(b) Based on consumers demand [ ]

(c) Based on quality of rice [ ]

(d) Based on cost of raw paddy [ ]
(e) Other (specify)…………………………………………………………..

58. Is the price received for milled rice different for the different varieties of paddy?

a) Yes [ ] b) No [ ]

59. Please provide Name of paddy varieties that fetches premium price for milled rice

Variety	Price(N/ Kg or tier)*

*Specify unit of measurement

60. Does the paddy variety you process belong to the varieties that receive the highest price? (a) Yes [ ] (b) No [ ] (c) Do not know [ ]

61. Why don't you process the varieties that receive the highest price?...

62. For the same variety of paddy, is the price received different for the different qualities of milled rice? (a) Yes [ ] (b) No [ ] (c) Do not know

63. Which criteria determine the price?

(a) Cleanliness [ ] (b) Absence of foreign material [ ] (c) Breakages [ ]

(d) Colour [ ] (e) others…………………………………….............

64. Will you be willing to change the variety of the paddy you process for the variety that fetches a higher price? (a) Yes [ ] (b) No [ ]

(c) Do not know [ ]

65. If No, why are you not willing to change the variety processed?

(a) Do not know how to get the paddy [ ] (b) No buyers for the rice [ ]
(c) Cannot afford the particular variety [ ] (e) Others…………………

66. What are the qualities of milled rice that fetches you a premium price?

....…………………………………………........

67. Do you seek information with regards to price of paddy and milled rice?

(a) Yes [ ] (b) No [ ]

68. Who provides the information…………………………………………………

69. Is rice processing a profitable business? (a) Yes [ ] (b) No [ ]

70. How does the profit obtained from the sale of rice help you?

(a) Self sustenance [ ]

(b) Children education [ ]

(c) Marrying off children [ ]

(e) Building a house [ ]

(f) Others (specify) [ ]

71. Please provide information on your marketing cost

Transportation…………………………………………………………………

Loading/off loading……………………………………………………………

Commission agents ……………………………………………………………

Market Revenue/Tax ………………………………………………………

Others ……………………………………………………………………………

72. What are the major constraints encountered in marketing of milled rice?

………
………
…………………………………………………………………

E. Investment in New Equipment

73. Are you planning to invest in a new rice parboiling Equipment? Yes [ ] No [ ]

74. If No why? …………………………………………………………………

………………………………………………………………………………………

75. If Yes, which equipment do you plan to buy? …………………………………

76. How much are you willing to invest?...

77. Where are you going to source for the equipment? ……………………….

78. How will you source for fund to buy the equipment? (a) Savings [ ]

(b) Relatives and friends [ ] (c) Banks [ ] (d) Cooperative [ ] (e) others (specify)………………………………………………………………............

79. Which equipment do you plan to buy? ………………………………………..

80. Why do you plan to buy the new equipment?

……
………