

**IDENTIFYING CONSTRAINTS TO FORMAL MARKET ACCESS BY SMALL-SCALE RICE FARMERS IN AHERO
IRRIGATION SCHEME, KISUMU COUNTY, KENYA**



A research project submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment
of the requirements for the Master Degree in Agricultural Production Chain Management –
Horticulture Chains.

By

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September 2017

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Acknowledgments

Sincere thanks to Royal Netherlands Government for the Netherlands Fellowship Program (NFP) grant that enabled me pursue postgraduate studies in Agricultural Production Chain Management (APCM).

Secondly, I would like to express my sincere gratitude to my supervisor Dr Resie Oude Luttikhuis for the continuous support of my Master study and related research, her insightful comments, motivation, and immense knowledge. Her guidance helped at all the stages of research and writing of this thesis. Besides my supervisor, I would like to thank the rest of my APCM lecturers with special gratitude to my mentor Albertien Kijne and APCM Master Coordinator Mr. Marco for motivation, guidance and support throughout the year.

My appreciation also goes to my employer, National Irrigation Board (NIB) management for accepting to release me for this study. Gratitude to Ahero Irrigation scheme Manager, farmer leaders, and staff for your overwhelming support during my study and research.

Last, I would like to give special thanks to my family: My wife, Syeda Tullu for professionally and spiritually supporting me throughout the writing of this thesis. Special thanks goes to my daughter Abqaria for her patience and enduring the time I was away. Great compliments to my parents and to my sisters for supporting me spiritually throughout writing this thesis and my life in general.

Above all, I thank God for giving me strength and sustenance in this beautiful foreign land away from home and family.

September 2017
Velp, the Netherlands.

Dedication

With sincere appreciation, I dedicate this thesis to my wife Tullu and daughter Abbi for their endurance and support when I was away.

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Equivalents

1 (one) Euro = Kshs. 122.00

Abbreviations

AIS	Ahero irrigation scheme
ASDS	Agriculture sector development strategy
CGK	County Government of Kisumu
EAC	East African Community
EAGC	East African Grain Council
FAO	Food and Agriculture Organization of the United Nations
FC	Formal chain
GM	Gross Margins
GoK	Government of Kenya
IFC	Informal Chain
KCB	Kenya commercial bank
KEBS	Kenya Bureau of standards
KEPHIS	Kenya Health Plant Inspectorate Service
LBDC	Lake Basin Development Company
MoA	Ministry of Agriculture
MoWI	Ministry of Water and Irrigation
NCPB	National cereals and produce Board
NGOs	Non-Governmental Organizations
NIB	National irrigation board
NRDS	National Rice Development strategy
PESTEC	Political, Economic, Social, Technological, Environmental, Cultural
SHG	Self Help Groups
SWOT	Strength, Weaknesses, Opportunities, Threats
VC	Variable Costs
WKRM	Western Kenya rice mills
WKS	Western Kenya Schemes
WKS	Western Kenya schemes

Abstract

Improving smallholder farmers' access to markets is critical in helping towards raising rural incomes and reducing poverty. Small-scale farmers in developing countries are excluded from formal markets due to power imbalance in the value chains, lack of transparency, and presence of too many intermediaries. Farmers in Ahero irrigation scheme, Kenya, have been farming since 1969, making them the most experienced rice farmers in Kenya. Marketing is however not organised despite the presence of several Government millers and farmer support programs in the County Government and National Irrigation Board. Majority of the rice farmers sell rice to informal traders at lower prices, shying way from Government controlled marketing channels.

This study aimed at identifying constraints to formal market entry by small scale rice farmers in Ahero irrigation scheme, Kenya, with a view of developing strategies to assist rice farmers access formal markets. To deliver these outputs, the study used a multi-dimensional definition of market access determinants including socioeconomic, physical, and institutional aspects. Rice value chain analysis was conducted with a focus on actors, service providers, marketing channels and revenues. The study used data collected from fourth to 28 July 2017 from a sample of 30 farmers clustered in to two groups; formal chain and informal chain using random sampling techniques. Data was also collected from five key informants purposively selected based on their roles in the rice value chain and the findings discussed in a Focused Group Discussion (FGD) at Ahero irrigation scheme.

Results of the study show that farmers supply rice through two major channels, formal government controlled millers and informal traders and brokers. Local traders control the bulk of the produce being marketed in the scheme despite the presence of government millers buying rice at a higher price. Farmers supplying through the formal chain have economic advantage compared to farmers in the informal chain, as the study established that farmers earned a higher price per kg with high gross margins compared to informal trade. Informal chain farmers incurred high transport costs per bag and high costs of repaying loans advanced by traders. The role of institutions was therefore found to be very limited, except the role of the cooperative society and groups. The major constraints to formal market access is delayed payments and corruption along the rice value chain. Delayed payments deny farmers the economic opportunity of intensifying production activities as they delay cropping program in the scheme. Other constraints included high-quality demand by millers, lack of appropriate and reliable market information, and limited access to formal credit.

The study recommends interventions aimed at improving formal market access through operationalization of warehouse-receipting system for prompt payments upon delivery of paddy to the cooperative society. The cooperative can access commercial paddy loan from the revolving fund to be able to pay farmers on delivery, and in turn bulk and deliver rice to the LBDC warehouse for selling at an appropriate time. For there to be transparency and curb corruption along the rice value chain, there needs to be proper accountability measures, which increase member's confidence in the cooperative, traders and millers. To achieve this, National Irrigation Board needs to initiate intra-value chain coordination in Kisumu County through participatory value chain development process aimed at increasing transparency, efficiency of information flow, identification of corruption prone areas and risks, and working collaboratively for higher resilience towards market access constraints. The study also recommends facilitation of the cooperative society to upgrade its fuctions from paddy collection to processing and distribution of branded Ahero rice through Western Kenya Rice Mills Ltd. Elimination of market access constraints will enable small-scale rice farmers reap economic benefits for improved incomes and livelihoods.

Key words: Formal Marketing channel, Informal marketing channel, Ahero irrigation scheme, Rice.

1.1 Background of the Study

Globally, rice has been the most important cereal crops in the fight against hunger. The total annual world production of milled rice stands at 400 million metric tons, which compares favourably with maize and wheat. The area under rice is 153 million hectares and it is foreseen to rise by 1.5% to reach 158.6 million hectares by 2020. (GoK, 2010). Moreover, unlike maize and wheat that are consumed as human and animal feed, rice remains the most favoured grain globally for human consumption. (Kürschner et al., 2012). Smallholder farmers worldwide produce most of the rice with less than two ha of farm holding. These farmers encounter numerous challenges and key among them is access to markets. Efforts to access markets and more so high-value markets have been a crucial part of many rural development strategies of the past decade. Functioning and accessible markets, particularly for agricultural products, are crucial for agricultural growth to realise its potential as a powerful driver of rural poverty reduction. (Kürschner et al. 2012).

The Agriculture sector is the backbone of Kenya's economy, directly contributing 24% of the GDP annually valued at Kshs 342 billion (US\$ 4.6 billion) and another 27% indirectly of GDP (valued at Kshs 385 billion equivalent to US\$ 5.1 million). This sector accounts for 65% of country's total exports and supports 18% of formal employment and more than 60% of informal employment in the country (Vision 2030). Therefore, the agriculture sector is not only the driver of Kenya's economy, but is also the means of livelihood for the majority of the Kenyan people. Kenya's main concern is food security as shown in the national plan "Kenya Vision2030" for priority sub-sector. Besides, "Agricultural Sector Development Strategy (ASDS)" the Government has declared that the improvement of agricultural productivity, promotion of agri-business, and facilitation of market access are priority targets. (GoK, 2010)

1.1.2 Rice Production and Marketing in Kenya

Small-scale farmers have over the years grown rice as a commercial food crop within both designated irrigation schemes and non-irrigated lowland and upland areas. In recent years, however, large-scale producers are emerging, for example the Dominion Farms in Siaya County. According to the Ministry of Agriculture, about 300,000 small-scale farmers derive a greater part of their livelihood from rice production. The consumption of rice is increasing at an annual rate of 12% as compared to 4% for wheat and 1% maize. This trend has been attributed to changing eating habits due to increased urbanisation, middle- class growth and an expanded retail market offering convenience based meals. The annual national rice consumption is estimated at 300,000 metric tons compared to an annual production average of 80,000 metric tons. The deficit is met through imports, which is valued at Kshs 10 billion in 2014. Promotion of rice production and market access among smallholder producers will therefore, improve food security, increase smallholder farmers' income, and eventually reduce the rice import bill. (NIB, 2015)

About 95% of rice production in Kenya comes from five (4) of the seven (7) Public irrigation schemes under the management of the National Irrigation Board (NIB). NIB is a state corporation established in 1966 through the Irrigation Act, Cap 347 of the Laws of Kenya and mandated to provide irrigation water, operate and maintain the schemes, promotion of marketing of agricultural produce from schemes and resolution of land disputes among farmers. (NIB, 2015)

In Kisumu County of Kenya, NIB manages two public irrigation schemes, namely Ahero and West Kano Irrigation schemes. Ahero was commissioned in 1969 and supports approximately 520 farmers on a net irrigated area of 840 ha. Currently, rice production in the scheme is mainly *non-aromatic and aromatic*

varieties (IR2793 and basmati 370) with each farmer licensed to cultivate 1.6 ha of irrigated rice in four fields, each of 0.4ha. (picture 1.12 for visual appraisal). Production activities are done in synchrony under one cropping calendar, which is drawn by NIB management together with farmer leaders. The main reason for synchrony is to allow farmers access water uniformly within one block, and flood fields at the same time for efficient water use. Main production season runs from May to December of every year, with one crop cycle. It is possible to crop twice, but due to market-related challenges, farmers are not able to purchase inputs in time for next crop.

Pic. 1.12 Rice production and Harvesting in Ahero Irrigation Scheme



Source: picture taken during field study, 2017.

Ahero irrigation scheme has an annual average production of 1,040tons from a net irrigated area of 867ha as shown in the table below;

Table 1.12 Rice production status in Ahero Irrigation Scheme

Irrigation scheme	Area (Ha)	Annual Output (MT)	Gross Value (Million Kshs)	Number of Farmers
Ahero	867	1,040	36.4	542
Total	867	1,040	36.4	542

Source; NIB (2016)

In Ahero Irrigation Scheme, rice trading other rice producing schemes is highly concentrated due to market liberalisation that saw opening up the rice market to the private sector. Government marketing bodies and regulatory agencies dominated the rice sector since for over 40 years, and the farmers in the scheme had no control over prices and cost of production. All the rice was channelled through the formal marketing channel with the government milling and distributing the rice. In Ahero, the situation changed from 2002 when the scheme was revived following the structural reforms undertaken in Kenya, and farmers took up production and marketing of their produce.

By analysing the relationship between the actors, MoA, (2008) identified four market linkages in Ahero region. They cover: (1) traders transacting directly with producers, (2) the bulking of paddy through self-help groups and cooperative society (3) the sale of white rice by processors and (4) the distribution to the final consumer. The consumer markets mainly comprise municipal markets and small retail outlets in the city- or village centres. They sell to local consumers in both urban and rural areas. The Government controlled mills sell their rice to institutions and retailers especially those that end up in high-end consumer segments.

1.2 Justification for the study

Kenya's liberalisation of agricultural markets was intended to increase efficiency by reducing transaction costs and increasing accessibility of markets through increased private sector participation, thereby giving farmers a wider choice of marketing channels. According to Shiferaw et al., (2006), outcomes of improved small-scale farmers' income from markets have not been achieved in majority of markets despite increased private sector participation. Generally, agricultural marketing chains in Kenya are long, not transparent, and consist of many actors, making them ineffective and unresponsive to farmer needs (GoK, 2010).

The rice sub-sector in Ahero has not been spared; rice market is not organised despite irrigation farming being a source of income and livelihood for many households in Kisumu County, market-related innovations especially by farmers, have not moved at the same speed. The formal Government channels offer better terms such as high prices. The Kenyan government through NIB and other stakeholders have focused efforts at linking farmers with formal channels by assisting them to form rice production and marketing groups and forming rice stakeholder forums where rice sub-sector issues can be addressed.

According to Tsourgiannisa et al., (2008), the marketing channel used to sell agricultural produce has a bearing on the profit producers make. Profit should, therefore drive farmers to supply rice through the formal channel, yet this often is not the case; it is not clear what constraints farmers from accessing this high-value channel. There has been extensive research on marketing channels and why farmers prefer one channel to another; and findings from numerous studies vary depending on the agricultural product, number and organisation of marketing channels, and the socioeconomic, institutional, and technical, environment the farmers operate. Constraints to market entry especially formal channel have received very little attention in Kenya and especially the rice subsector, with focus in majority of studies being on other aspects of value chains and production figures. There is need to complement the seemingly successful advances in the primary production with innovations in product marketing. This study, therefore, sought to provide information on the constraints of accessing formal marketing channels and give applied recommendations on strategies that can be adapted to assist small-scale rice farmers' access to formal markets.

1.4 Problem statement

One of the core mandates of NIB as per the irrigation act is to promote marketing of scheme produce and ensure access to market by smallholder public irrigation scheme farmers for improved income and livelihoods. However, NIB lacks information on what constraints rice farmers' access to lucrative formal markets in Ahero Irrigation Scheme. The inability of smallholder farmers to engage in formal rice markets is great cause for concern. NIB in its pursuit to meet market access objective has set up a modern rice mill in Ahero irrigation scheme. Despite this set-up, majority of farmers (70%) sell their rice through the informal channel, which is less demanding regarding the quality of rice and transactions are made at the farm gate immediately after harvest. They trade in the lower price and quality channel hence reduced incomes and inability of NIB to meet its mandate. The essence of the problem lies in identifying those constraints that are currently hindering smallholder farmers from accessing formal markets.

1.5 Problem Owner

Smallholder rice farmers and National Irrigation Board (NIB): Failure by small-scale rice farmers to access formal markets affect operational performance of NIB in both not meeting one of its mandate as well as not being able to collect sufficient money from farmers due to lower incomes from informal chain. One of NIBs specific mandates as spelt out in the irrigation act, cap 347 is to promote the marketing of crops

grown or produced in public irrigation scheme. This is envisioned to happen through farmers and farmer organisations marketing their produce at highest possible price. Farmers on one hand need prompt payment after harvest of rice at better prices for improved income and hence ability to pay for operational costs of the scheme as well as meet production costs.

1.6 Objective of the research

To identify constraints to formal market access by small scale rice farmers in Ahero irrigation scheme, With a view of recommending possible strategies that can be used to assist small-scale producers access formal markets in the rice value chain.

1.7 Research Questions

1. What are the aspects of rice value chain in the study area?
 - i. Who are the stakeholders in the rice value chain in the study area?
 - ii. What marketing channels exist in the study area? What are their characteristics?
 - iii. What are the economic benefits derived by smallholder farmers in the formal marketing channel?
 - iv. What are the revenues and transaction costs among the actors in the formal and informal chain?
2. What are the dimensions of formal market access among paddy producers in the study area?
 - i. What are the product characteristics preferred by formal markets? Are farmers able to meet the required product characteristics?
 - ii. What production and marketing aspects constrain farmers from accessing formal markets in the study area?
 - iii. What are the socio-economic aspects that constraint access to formal markets along the rice value chain in the study area?
 - iv. What institutional factors affect farmers' access to formal markets in the study area?
 - v. What possible strategies can be adapted for farmers to access formal marketing channels?

2.1 Introduction

The purpose of this research is to identify constraints to formal market entry by small scale rice farmers in Ahero irrigation scheme, with a view to recommending possible strategies that can be used to assist them access formal markets in the rice value chain. In this chapter, literature related to the study is reviewed; specifically defining key words, highlighting the rice subsector in Kenya, and the existing marketing channels. Value chain concept, economic opportunities for smallholder farmer accessing formal marketing channels, constraints faced by smallholder farmers in accessing formal markets and finally the strategies that policymakers and institutions can use to assist small-scale producers access formal markets.

2.2 Definitions of key terms

1. **Market access:** Market access refers to the processes by which people access markets in relation to the nature, efficiency and costs of these processes (KIT, 2006).
2. **Marketing channel:** is defined by Chamberlin and Jayne (2013), as “a set of interdependent organizations involved in the process of making available a product or service for use or consumption”.
3. **Paddy rice:** Paddy rice is the individual rice kernels that are in their natural, unprocessed state. In some definitions, it is referred to as rough rice, paddy rice is the harvested product from rice field
4. **Small-scale farmers:** These farmers have less than 2 hectares of cropland as defined by FAO (2014)). The agricultural sector in Kenya mostly consists of smallholders (GoK, 2010) owning small-based plots of land on which they grow subsistence crops and one or two cash crops or keepin livestock and relying almost exclusively on family labour.

2.3 Overview of rice sub-sector in Kenya

In Kenya small-scale farmers in Kirinyaga County, Busia County, Coast region, and Kisumu County (Ahero, West Kano, and South West Kano schemes), mainly produce rice. About 300,000 small-scale rice farmers provide labour and earn their livelihood out of rice production. There are four major rice mills owned by Government across the country. Among them, include LBDA, NCPB, and WKRM. These are the major traders of rice in Kenya. Additionally, there are several small privately owned mills located within the rice producing areas, which emerged due to private sector involvement in rice marketing. The table below shows rice production and consumption trends in Kenya. (MoA, 2016)

Table 2.3: Rice Production, Consumption and Domestic Values in Kenya (2010-2016)

Year		2011	2012	2013	2014	2015	2016
Area planted (Ha)		13,322	15,940	23,106	16,457	16,734	17,315
Production (MT)		49,290	57,941	64,840	47,256	73,141	75,167
	50Kg bags	986,801	1,158,929	1,296,811	945,118	1,462,820	1,503,340
Average yields	MT/Ha	3.7	3.6	2.8	2.9	3.0	3.2
Value (Kshs. Billion)		1.3	0.9	3.3	2.7	2.4	2.6
Consumption (MT)		270,200	279,800	286,000	293,722	295,600	301,000
Surplus/Deficit(MT)		-220,910	-221,859	-221,160	-246,466	-227,859	-225,833
Annual deficit as % of total requirement		82%	79%	77%	84%	76%	74%

Source: MoA (2016)

2.1.1 Kenya's rice marketing channels

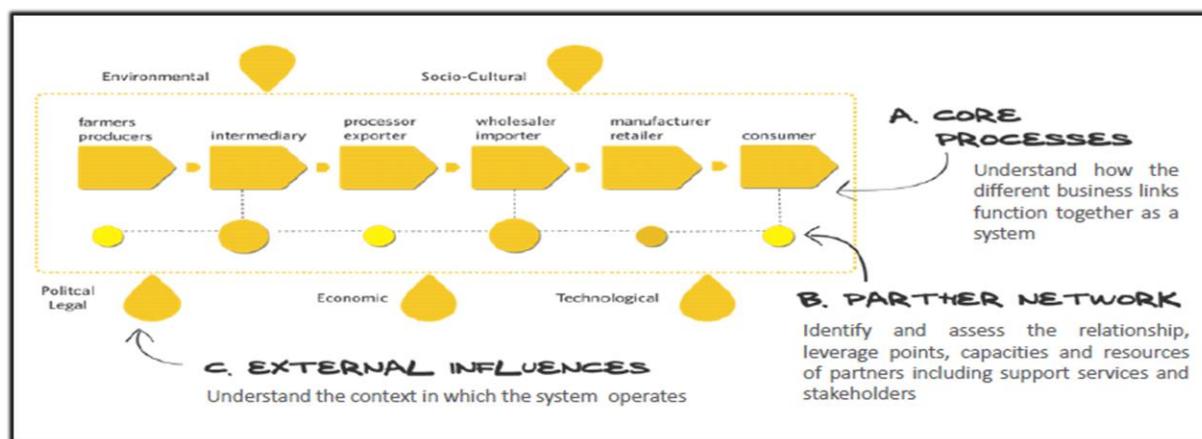
Before liberalisation of Kenya's cereal sector in 1993, rice marketing, including pricing was controlled by Government through National Irrigation Board. Since then, trading and marketing of rice have continued to be done by several value chain actors at free market prices determined by supply and demand. These market channels include the formal Government controlled, Informal private traders, local markets, cooperatives and private milling companies. (MoA, 2013)

Informal rice market channels include unofficial transactions between farmers, and farmers' direct sales to consumers and intermediaries (brokers). Government controlled formal markets (such as farmers selling through the cooperatives to Government millers) have defined grades, quality standards and safety regulations (GoK, 2010).

2.4 The Value Chain Concept

The value chains have had different definitions arising from various studies. For instance, KIT (2006) defines value chains as set linkages between chain actors who seek to support each other with the aim of increasing efficiency and competitiveness. As per Ruduner (2007), value chains analyses the relationships between linkages and information flows within the chain. Although the value chain concept is well pronounced in almost all sectors in the developed countries, it is rather a new concept in developing countries but it is slowly being recognised and promoted by governments, development agencies, and private sector.

Fig. 2.4; Value chain process



Source; KIT (2006)

The concept of agricultural value chains has attracted many scholars in the marketing field. For smallholder farmers to be incorporated along the value chain, they must be able to comply with market requirements such as economies of scale, meeting quality requirements, and consistency. Shepered, (2004) highlighted that if a value chain approach is not adopted, especially in developing countries, the 'unseen hand' type of coordination (such as opportunistic behaviour, self-interest, short-term relationships, limited information sharing) will prevail in traditional spot markets.

2.4.1 Chain Players

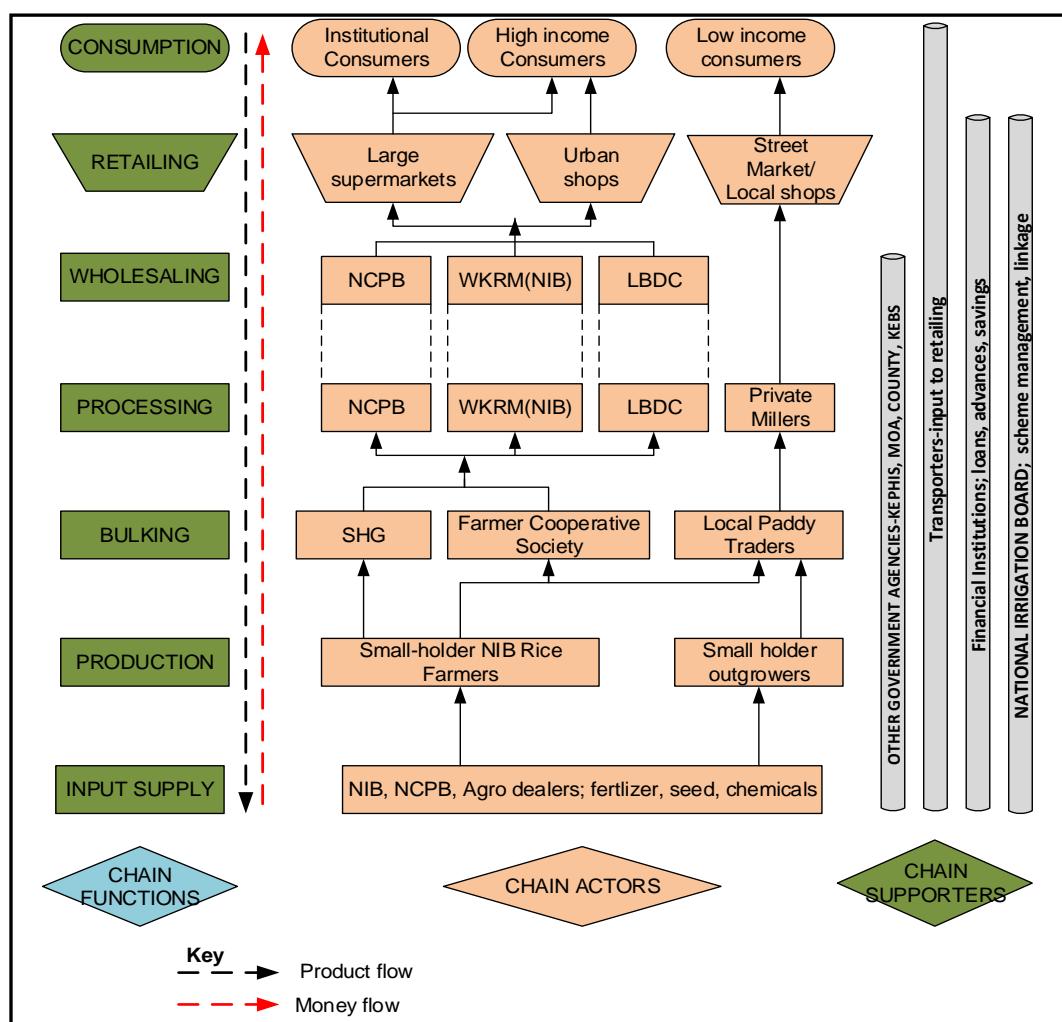
Ruduner, (2007) systematically viewed chain players as chain actors, supporters and influencers. Chain players in the rice sub sector consist of players described here below and illustrated in the chain and stakeholders' matrix below.

Chain actors: Chain actors are chain players who deal directly with the products either by being producers, processors, traders, or consumers. They own the product at a given stage in the value chain (Ruduner, 2007). Value chain actors include input suppliers, producers, traders, processors and consumers. These actors are commercially involved in the chain with each having a benefit from ownership of the product or transfer to the next actor.

Chain supporters: These individuals or organisations provide services to chain actors and are not directly involved with the product. The services they render are aimed at adding value to the product. They include transporters, extension service providers, and financial and non-financial service providers.

Chain influencers: These people, institutions and organisations are responsible for establishing regulatory framework for favourable and enabling environment to do business by providing political, social and economic stability (Ruduner, 2007)

Fig. 2.4.1: Rice Value Chain Map in Ahero Irrigation Scheme



Source; Tanui, (2016)

2.4.2 Stakeholders in Agricultural-value chains

In Ahero Irrigation scheme, the key actors, influencers, and supporters include is shown in table 2.4.2

Table 2.4.2. Actors in rice value chain in Ahero Irrigation Scheme

Actor	Specific actors in the area	Specific functions
Input suppliers	NIB, NCPB, Local agro vet dealers.	NIB is supplier of certified rice seed to farmers in the scheme. NCPB supplies subsidised Government fertiliser to farmers organised in groups. Local Agro vets supply fungicides and pesticides.
Producers	Small scale rice farmers-tenants	Rice production in the area. Registered with NIB to hold land in trust and grow rice in designated area..
Collectors	Smallholder rice self-help groups and 1 Cooperative (Ahero Cooperative society)	Assist in production and marketing of rice. Groups are majorly production support oriented. Cooperative collects and markets members produce. Help members buy inputs in bulk and give advances/loans.
Traders	Local traders and small millers.	Buy rice majorly from farmers at farm. They work closely with brokers in collecting rice from farmers. They mill and supply local shops and open markets in nearby towns
Processors	NCPB, WKRM, LBDC, Local millers	Buy rice in bulk from Cooperative societies and some groups. Mill and sell to institutions and leading supermarkets. Local millers buy in small scale and supply milled rice to Local shops, markets.
Wholesalers	Large millers, Cereal traders.	Buy milled rice from large commercial millers (Government millers) and supply retail shops within the area especially in Kisumu city.
Retailers	Urban shops, Open-air markets	Buy rice from wholesalers and millers in the area Operate small shops and outlets. Pack rice into small quantities and Sell rice to consumers in rural areas and in cities as well as rural areas.
Consumers	Rural, urban and institutional consumers	Buy and consume rice.

Source; Tanui, (2016)

2.5 Formal and Informal Markets

Informal market is the non-formal segment of a market economy where the economic activities are unregulated and largely not included in any formal arrangements or contracts. In contrast to formal market, it is relatively easy to enter into the informal market. The fact that the informal and formal market is closely linked makes it more complex. Through trade of materials, exchange of knowledge and skills creates links and relationships between the two economic sectors, and it is not unusual that a person participates in both the informal and formal markets. (Ruduner, 2007).

2.5.1 Smallholder farmers' access and participation in formal marketing channels.

There is widespread agreement that small-scale farmers require improved access to output markets to increase their farm productivity and living conditions. Two major features characterise the current policy dimensions of market access in sub-Saharan Africa. First, small-scale holders are viewed as operating under poor market access conditions, with high levels of remoteness and related high marketing costs

and risks, and poor access to supporting services. In recent decades, these poor access conditions are perceived to have been either constant or worsening. Majority of remote places have not experienced notable infrastructural changes since independence, and the private sector has not filled the gap left by the withdrawal of the Government bodies in agricultural markets after the inception of market liberalisation programs (Ismail et al., 2013).

2.5.2 Economic Opportunities for smallholder farmers participating in formal markets

Several studies have attempted to prove that smallholder farmers can get positive effects from accessing and supplying formal markets. These channels are known to be lucrative regarding paying a high value for products supplied. Some of the economic benefits that farmers can derive from this channel include an increase in production and productivity, asset stocks, profit share, and welfare. (Rao et al., 2012).

By participating in formal marketing channels, smallholder farmers can reach high levels of efficiency with regard to market access barriers. An example is the study by Aparna and Hanumanthaiah (2012), where he compared marketing costs, marketing efficiency and constraints, price distribution and profit share among farmers in India. He found out that, the formal channels of supermarkets was more efficient for smallholder vegetable farmers. Vegetable farmers who supplied these channels received a higher net price and at the same time had lower marketing costs.

2.6 Constraints to smallholder integration into formal markets

To be able to understand smallholder farmers' potential and constraints regarding their participation in the formal chain, it is essential to identify the critical factors that determine market access. "Market access has multiple dimensions which may not be easily reducible to a single index". (Chamberlin and Jayne, 2013). Constraints identified through review of literature, therefore, take a multidimensional approach, which includes the following:

2.6.1 Institutional constraints in Agricultural marketing

i. The concept of Imperfect Market Information

Market information is vital to market access behaviour of smallholder farmers. Market information allows farmers take informed marketing decisions that relate to supplying necessary goods, searching for potential buyers, negotiating, enforcing contracts and monitoring. According to Baloyi (2010), small-scale farmers in rural areas, have little information about the market demand, which is expensive to obtain given the travel time and cost required to get information from towns and government offices. Farmers may find information through contact with other actors in the product chain, but the accuracy of this information is not authentic, since those actors might be exhibiting "opportunistic behaviour". Farmers relying on informal channels for market information are at risk of getting biased information due to the opportunistic behaviour of the more informed group

Several studies such as Jakwe, (2011), have demonstrated that efficient market information have positive benefits for farmers and traders. Up-to-date information on prices and other market factors enables farmers to negotiate with traders and facilitates spatial distribution of products from rural areas to urban markets. Most governments in developing countries have tried to provide up to date market information services to farmers, but these have shown to experience sustainability challenges. Moreover, even when they function, the information provided is often insufficient to allow business decisions to be made because of time lags between data collection and dissemination. (Kürschner, 2015).

ii. The concept of transaction costs

Transaction costs stems from Coase theorem (1937), which explains that exchange between two business partners does not operate in a frictionless environment and thus incurs some costs of doing business so-called transaction costs. According to Ouma et al., (2010), transaction cost theory has been widely used in studying agricultural markets in developing countries. Transaction costs are therefore defined as any other costs, other than cash price, that are incurred during trading. Transaction costs hamper exchange and hence reduce markets' ability to reach efficient prices leading to multiple possible price imbalances in the market for a similar product. These include the costs of searching for a trading partner, the costs of screening partners, of bargaining, monitoring, enforcement and, eventually, transferring the product to the next owner. (Fischer & Qaim, 2012)

Studies such as Ouma et al., (2010) highlighted that transaction costs arising from transportation and marketing information costs influenced the decision of high-value market participation of smallholder farmers. Farmers in Ahero region, being in a developing country, are most likely to be faced with high transaction costs due to information asymmetry and poor infrastructure.

iii. Selling prices of agricultural products

Prices of agricultural produce fluctuate widely between areas, within a season, and between seasons. This is attributed to the dominance of rain fed agriculture, common harvest failures, the limited storage facilities, and the limited incorporation of markets due to poor roads. Within "normal" seasons, farmer prices of staple food crops can be expected to double or more from immediately after the harvest to the "lean season" before the next harvest. Changes in final consumer prices may be somehow smaller, as the transport costs, which are part of the overall gross margin, are more or less constant through the year (Poulton et al., 2014).

iv. The role of Farmer Organizations

Imperfect markets, resulting from limited information availability and technology, credit access, and high transaction costs often hinder small-scale farmers to reap the economic benefits of high-value market channels. Hellin et al., (2009). Collective action strategies through farmer cooperatives or farmer groups can enable small-scale farmers to create economies of scale in production, as well as competing favourably in high-value markets. Moreover, farmer organisations have other benefits including facilitation of production and marketing, financial services, capacity-building services, welfare services, policy advocacy, and common property resource management (Stockbridge et al., 2002, cited in Narrod et al., 2009).

Previous studies such as Ishmail et al., (2013) also provide evidence about farmers accessing high-value markets. For example, the use of farmer organisations has provided a higher chance for small-scale vegetable growers in Kenya to access supermarket channels. However, there was an opposite finding by Blandon et al., (2009), when he studied the role of producer groups in Guatemala tomato growers. The effect of producer organisation was significant, but negative. The reason was that the organisations were not for marketing, but just provided technical assistance and training. Nevertheless, most of the studies show that majority of the high-value suppliers are more likely to be members of farmer organisation.

v. Trust relationship between buyers and producers

According to Chamberlin & Jayne (2013) an important barrier for small-scale farmers to access the lucrative formal markets chains is trust between producers and buyers. A study by Blandon et al., (2009) established that mutual trust between transacting entities had a positive and significant relationship with the likelihood of supplying formal supermarket chains in Honduras. Farmer organisations and their members who do not meet often to discuss arising issues are found not to trust one another and hence members shy away from collecting their produce together. This study will be crucial in unravelling the trust relationship, more so on financial accountability between producers themselves, and among producers with buyers and how this constrains smallholder farmers' access to formal channels.

2.6.2 Technical constraints in smallholder agricultural marketing

i. Infrastructure development aspects

Technical aspects of marketing can be viewed as those factors that allow goods to be available on the market at lower costs. Jari and Fraser (2009) pointed out that most smallholder producers in developing countries lack appropriate transport facilities, poor road networks, limited communication links, and limited availability of storage facilities. Further, smallholder producers have limited capacity to add value to their produce. Lack of these facilities constraint farmers supply ability to high-end markets. In many cases, the cost of these facilities is too high for farmers and intermediaries in agricultural value chains to get any significant benefits from their trading activities.

ii. Production and marketing aspects

a) Product Characteristic (Grades and standards)

Consumers nowadays demand high quality for the goods they buy. To add to this, they will not buy food products unless there is a guarantee that they are safe to consume. Jari and Fraser, (2014). They argued that consumers make purchasing decisions depending on packaging, consistency as well as uniformity of goods. They further argued that farm produce from smallholder farmers do not meet certain market grades and standards because the farmers lack the skills, knowledge, information and resources to ascertain such requirements.

Most smallholder products lack defined grades and standards and, therefore, cannot meet the consumers' demands. Jari & Fraser, (2014) attributes this to institutions for determining market standards and grades, which tend to be poorly developed in smallholder farmer's environment. Due to doubt on the reliability and quality of their products, they usually cannot get contracts to supply formal channels such as shops. For farmers to sell paddy rice, Kenya Bureau of standards have set quality standards for paddy rice as shown in table 2.6.2

Table 2.6.2: Quality standards for paddy rice in Kenya

No	Characteristics	Maximum limits			Test Method
		Grade 1	Grade 2	Grade 3	
i.	Foreign matter, %m/m	1.0	1.5	2.0	ISO 605
ii.	Pest damage, %m/m	0.5	0.25	0.5	
iii.	Discolored grains, %m/m	0.1	0.5	1.0	
iv.	Moisture, %m/m	14			ISO 711/ISO 712
v.	Immature grains, %m/m	1	3	5	ISO 605
vi.	Total Aflatoxin, ppb	10			ISO 16050

Source; MoA, (2013)

b) Inconsistency in production

Several studies indicate that smallholder farmers lack consistency about supplying products to markets with regard to quality and quantity. According to Jari and Fraser (2014), many farmers can only deliver products to fresh produce markets for two or three months in a year and cannot achieve continuity in the market. Supermarkets are reluctant to buy from smallholder farmers for this reason. In Ahero Irrigation Scheme, the crop cycle is once a year, and as per NIB annual reports, there are periods of surplus and shortage of rice in the region, a situation they attributed to all farmers growing rice within the same month and harvesting in synchrony.

2.6.3 Socio-Economic aspects of agricultural marketing

Socio-Economic characteristics that define smallholder farmers include their demographic characteristics, land holdings, ownership of capital resources, household income, occupation, output prices, and their level of training and farming skills. (Jari and Fraser, 2014).

The influence of the Socio-Economic characteristics on smallholder farmers' participation in formal marketing channels have been found to be different across industries and countries. Rao et al., (2012). Studies reviewed in this research show some similarities and differences regarding Socio-Economic variables between farmers supplying formal markets and traditional market channels. Narod et al., (2009) examined factors affecting Kenyan horticultural producers marketing decisions, and he found out that smallholder farmers who owned relatively bigger farm plots were likely to sell their produce in a supermarket. This is similar to a case of vegetable farmers in Kenya by Ishamil et al., (2013). However, in some cases farm size had no significant effect on the decision of farmers to sell their produce to high-value markets as shown by studies such as apple growers in China (Miyata et al., 2009).

Demographic variables have also been outlined to play a role in farmers participating in the formal marketing channels. Demographic factors such as age, education level, household size, and off farm employment, have effect on farmers' choice of marketing outlet (Miyata et al., 2009). For example, some studies found out those smallholder farmers who sell their produce to high value markets have a higher education level than traditional market suppliers (Rao & Qaim, 2011). Others found that there was no correlation between education levels and marketing channel choice (Blandon et al, 2010).

2.7 Improving Market Access amongst small-scale farmers

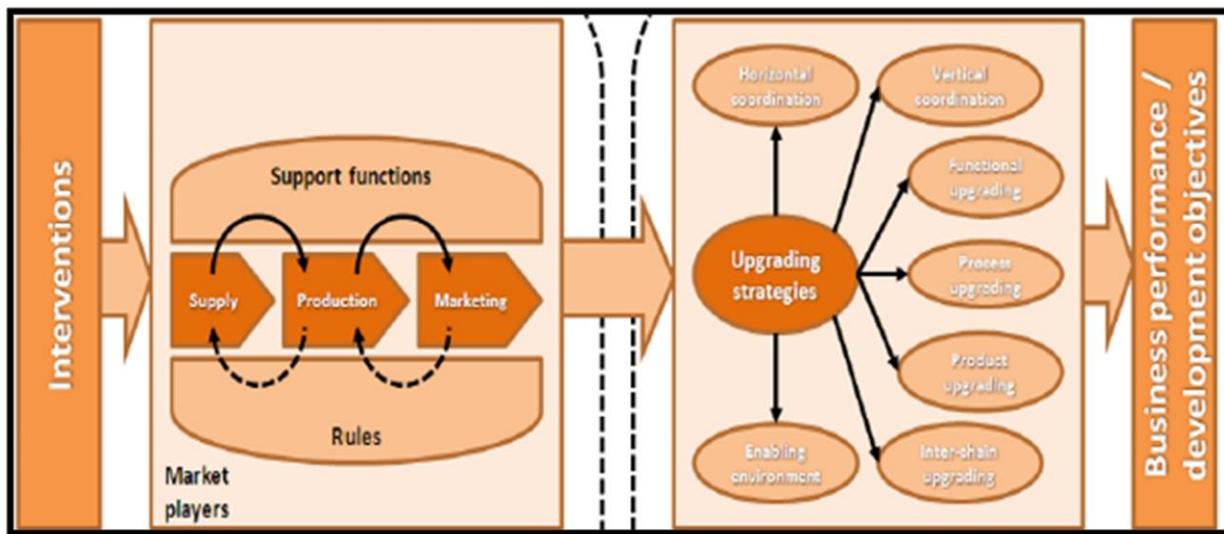
For smallholder farmers to be able to make rational economic decisions, both the economic and technical constraints that they face must be removed. Mangisoni (2006). In addressing constraints to market access, comprehensive agriculture and marketing support services become a necessity. Several studies have tried to link different strategies to market access among smallholder farmers in Africa and other continents. Some of the reviewed strategies that have been successful in various parts of the Sub-Saharan Africa include:

- i. **Agricultural Value chain financing strategies:** The main objective of financing value chains is to address perceived constraints and risks by providing innovative ways of delivering financial services to rural producers and agribusinesses. KIT, (2010). Majority of smallholder famers do not have access to formal credit lending institutions and end up participating in embedded services e.g. taking inputs on credit from suppliers, which in most cases is expensive to repay. Krushner et al, (2015). So the farmers' financial needs include loans to pre-finance production activities, and prompt cash payment for their produce after harvest (or even beforehand). Warehouse receipting system has been explored in Mozambique through ACRA market access program and found to work well in

ensuring farmers receive prompt payments upon delivery of produce. This works well on tripartite arrangement, which includes a financial institution, farmer organisation, and the buyer.

- ii. Chain upgrading strategies;** Lazzarini et al., (2001) suggested that small scale producers should exploit existing linkages of social interactions which provide social capital to enable them vertically integrate their activities in the agricultural value chain. According to KIT and IRR., (2006), this vertical integration enables small scale farmers to be involved in many activities such as marketing as a group or society and processing and not only production. Input supply and marketing become more efficient. In addition to this, small-scale farmers can engage in horizontal integration where they get involved in value chain management, which include product development and price negotiation in a business cooperative scheme. Figure 2.7 illustrates the operation of chain upgrading in a value chain process.

Fig. 2.7: Value chain upgrading strategies for organised marketing.



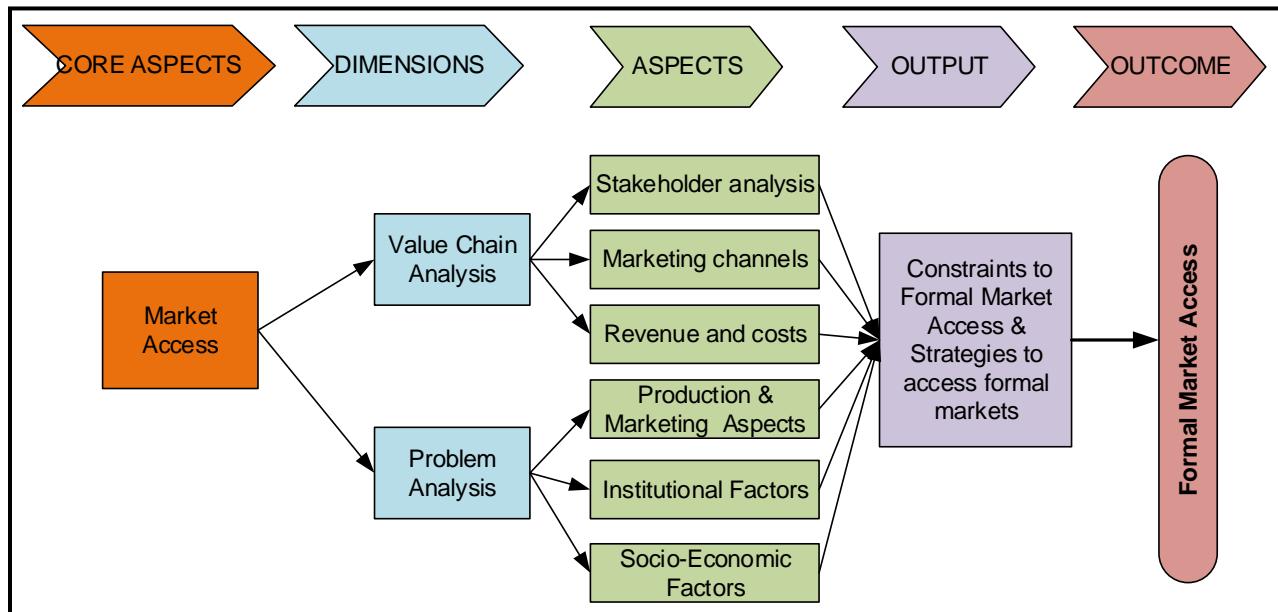
Source: KIT and IRR., 2006.

- iii. Collective action strategies;** Collective action strategies through producer organizations such as cooperatives can enable farmers to create economies of scale especially in production and be able to compete favorably in high value markets.. In addition to this, there are important services provided by farmer organizations such as production and marketing facilitation, financial services, capacity building, welfare services, policy advocacy, and common property resources management. (Narrod et al., 2009)

2.8 Conceptual Framework

The value chain concept was used to identify key informants for data collection and to analyse the rice value chain and produce an inventory of the actors, chain supporters and their functions. Market access dimensions are used for problem analysis which seeks to unravel the factors within institutional, socio-economic and product characteristics that limit farmers access to high-value formal markets.

Fig 2.8 Conceptual framework



Source: Adapted from Ruduner, (2007)

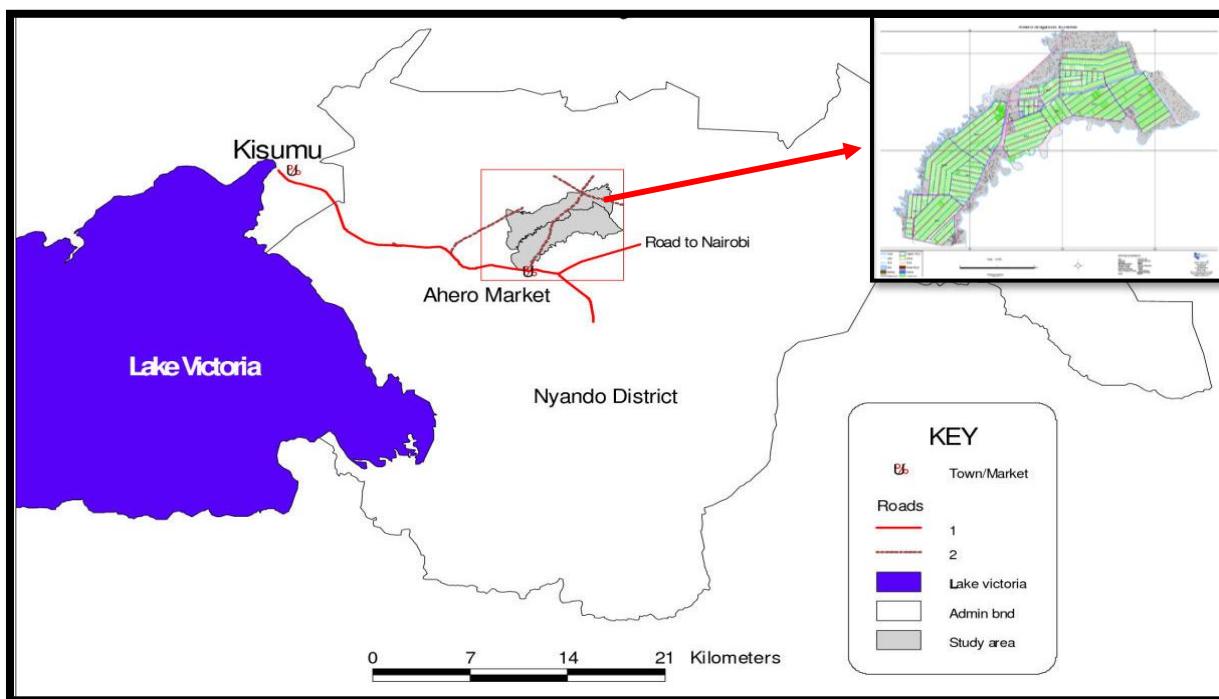
In this study, the researcher conceptualise Institutional, production, and socio-economic factors as the factors that constrain access to formal markets. Institutional aspects of marketing and economic development include transaction costs, market information flows, grades and standards, market organisation, and farmers' training and education. Technical factors such as infrastructure and production factors like acreage a farmer has may have some influence on which market to sell. Farmers with low volumes may not access formal market due to lack of economies of scale. Socio-economic factors such as level of education and income are also hypothesised to constrain access to high-value formal markets, as the majority of the farmers tend to have immediate need for money after harvesting.

This chapter presents the study area, study design and data collection strategy and the way the data collected was analysed. The research used both qualitative and quantitative approach through desk research to obtain secondary data and field research by use of structured and semi-structured interviews as well as Focused Group Discussion.

3.1 Description of the Study Area

This study was conducted in Ahero Irrigation Scheme under the management of National Irrigation Board. The scheme is one of the seven public irrigation schemes in Kenya with its location in Western Kenya, Kisumu County. The area receives rainfall pattern of western Kenya zone that is characterised by bimodal rainy season and irregular heavy storms due to the influence of Lake Victoria. Annual temperatures range from 22.1 °C in May to 23.5 °C in March. The average yearly precipitation is approximately 1200 mm. The general soil characteristics are deep black cotton soils with high clay content that swell when hydrated or shrink when dry. (KNBS, 2010).

Fig. 3.1 Study site in Kisumu county. Inset, Ahero Irrigation scheme layout.



Source; NIB, 2015

The study area is highly favoured by natural resources, which include permanent rivers that supply year round irrigation water to the three public irrigation schemes in the county. The major agricultural crop in the county is rice. Rice is grown under irrigation in the schemes. Most of the water for irrigation comes from River Nyando (permanent river), whose annual floods displace high numbers of people but also deposit a lot of fertile soil all across the plain. The northern and eastern fringes of the Kano Plains also play host to some of Kenya's most productive sugarcane fields. Towns like Kibos, Miwani and Chemelil are centers of sugarcane production. Kisumu County also produces maize, beans, sweet potatoes, poultry and fresh vegetables. (GoK, 2008)

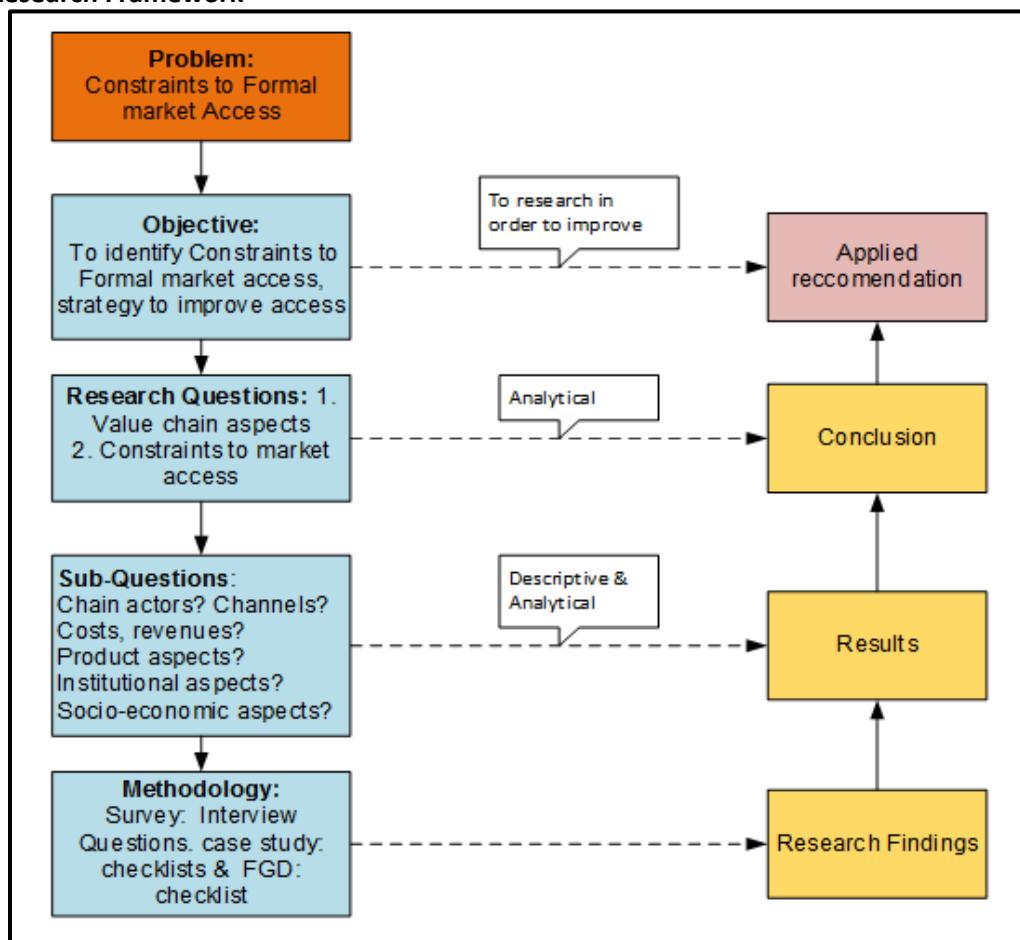
3.1.1 Ahero Irrigation Scheme

AIS is located in Kano Plains, Kisumu County, overlooking the Nandi escarpment to the north. The scheme has been in operation for over 40 years and it would be of interest to study the challenges of farmers with regard to accessing formal marketing channels, given that farmers have both experiences of selling rice prior to liberalisation of agricultural markets and post liberalisation changes, which saw the exit of Government marketing boards.

3.2 Research design

The research used both qualitative and quantitative approach through desk research to obtain secondary data and field research in Kenya. Semi structured questionnaires were used to collect data on socio-economic aspects of farmers, institutional constraints to formal market access, and production and marketing aspects. This data compared findings from informal and formal chain with the aim of deducing similarities and differences. A semi-structured interview (checklists) was also used to collect data from key informants who had in-depth information on the rice sub-sector within the study area. A focus group discussion (See Annex A for questionnaire and checklists) was also conducted to compare and discuss findings from survey and interviews as well as identifying constraints and discussing strategies for improving formal market access. Data collection was undertaken from July 3, 2017 to 28 August 2017.

Fig. 3.2 Research Framework



Source; Researcher's conceptualization, 2017.

3.2.1 Survey

Survey was conducted in Ahero Irrigation scheme through a structured questionnaire designed for rice farmers. One NIB officer (Irrigation Officer, Ahero Irrigation Scheme) was scheduled to assist in data collection, but at the time of going to the field, he had been selected to participate in a training program outside the country, hence he was not available. The researcher therefore administered thirty questionnaires and conducted interviews with key informants.

Thirty (n=30) smallholder rice farmers were selected through selective sampling from the list of farmers provided by NIB management. Two clusters of farmers were formed. Fifteen (15) farmers selected from NIB register formed one cluster; and these were farmers who are not members of Ahero Cooperative society, and they do marketing of rice on their own at farm level. These farmers were considered to be in the informal rice chain. The other cluster of fifteen (15) farmers comprised Ahero Cooperative society registered members, and they collect and sell rice through the society. The society provided a list of members. This cluster was considered to be selling paddy rice through the formal chain.

The questionnaires were administered one on one with the respondents from the two clusters. The questionnaire focused on; present market outlets and constraints, farmers' perception on the current marketing channel, costs and revenues, socio economic aspects, and institutional aspects that constraint market access. (*See survey questionnaire annex A*). Prior to undertaking questionnaire administration, the researcher held one meetings with scheme management to explain how the questionnaires would be administered, with three farmers being selected for questionnaire pre-testing. Three questions were omitted after the pre-testing as they were found to be replicated in other questions.

3.2.2 Case Study

The second method of data collection used in this research was case study involving interviews with five (5) stakeholders actively participating in the rice value chain. This was conducted with the use of a semi-structured questionnaire (Checklist). To select the informants, purposive sampling technique was used. The interviews were conducted with the selected key informants as described below in face-to-face process using a checklist (*checklists annex B*). These stakeholders were known to play key roles in the various functions in the rice value chain. Earlier during planning phase, it was intended that interviews would be conducted with local rice trader (Jay Jay Traders), NCPB manager, NIB manager, Ahero cooperative society chairman, and the County executive member (Agriculture Minister) in Kisumu County. During data collection period, NCPB manager was not available, and the facilities were closed for major repairs, hence the researcher opted for Lake Basin Development Company (LBDC), which is also a Government owned miller performing the same functions as NCPB.

1. Interview with local trader

Ahero market trader (Jay Jay traders) dealing with rice was selected purposefully because of long time trade with Ahero farmers (See annex D). This trader has a small mill in Ahero town (see pic 3.2.2.1). Being a rice trader in the study area, the informant had in-depth information on situation of rice marketing in the study area such as price, transaction costs and main constraints in the sub sector. The study also provided information on rice trading in the informal chain in the study area, which is important in drawing a comparison between the more organised formal channel and the spot selling channel that he is involved. The interview involved the researcher and the trader.

Pic 3.2.2.1; Jay Jay trader's premises with mill, and local market women selling rice.



2. Interview with County Executive Member, Agriculture (Kisumu County)

Following the promulgation of the Kenyan Constitution in 2010, the agriculture function was devolved from the National government to the respective 47 counties created. One of the counties is Kisumu County where Ahero Irrigation Scheme falls. The county executive member (appointed by the county public service board) heads the agriculture department at the county level. One of the functions of the department is promotion of agricultural production and marketing of agricultural produce in the County. The officer therefore was identified to give information on strategies and policies being implemented at the ministry concerning farmers' market access. Challenges and opportunities of farmers participating in formal chain were also discussed. (See annex D)

Pic;3.2.2.2 Interview with CEC, Hon. Obade at county offices, Kisumu.



3. Interview with Lake Basin Development Company (LBDC) Manager

LBDC is a Government agency with the mandate of trading in quality grains, agricultural products and related services. One of the key grains under mandate of LBDC trading is rice. In pursuit of its business mandate, the company has strategic grain handling and storage facilities in Kisumu, and currently it buys rice from Ahero irrigation scheme farmers mainly through the farmers' cooperative society. It is therefore an important stakeholder in rice value chain and interview with the manager focused on rice trading, opportunities for farmers, product characteristics, costs and revenues, as well as farmer challenges. Possible strategies for ensuring farmers participate in formal chains was also discussed. (See annex D). Pic 3.2.2.2 shows the author conducting interviews with LBDC officials.

Pic 3.2.2.2: Interview with LBDC Marketing manager (Mrs. Centrine) and LBDC General Manager



4. Interview with National Irrigation Board Manager

As per the Irrigation Act, one of NIB's mandates is Promoting marketing of crops and produce in national irrigation schemes in liaison with organisations responsible for marketing of agricultural produce in all schemes. The board has also set up a rice mill facility in Ahero Irrigation Scheme with the objective of buying rice in bulk from farmers and milling it to enable farmers' access formal markets. Due to this development, NIB management is a key stakeholder as it deals with production management to marketing of rice in the scheme. Hence, interview focusing on marketing aspects, challenges, product characteristics, institutional aspects among others were discussed. (See annex D)

5. Interview with Ahero Cooperative Chairman

Ahero Cooperative society chairperson was interviewed to provide information on the status of the rice marketing in the study area. Discussion focused on functions or services in the chain, how information flow to members and the current challenges being faced by smallholder farmers in accessing formal chains. Possible strategies that can be implored to improve market access to the formal chain were also discussed. (See annex D and supported by Pic 3.2.2.5)

Pic 3.2.2.5; interview with Ahero cooperative chairman, and researcher checking farmer documents.



3.2.3 Focused group discussion

FGD was conducted with 12 block representatives (comprising three cooperative officials, three-scheme water user's association members, three scheme advisory committee members, and three revolving fund committee members). Also invited for FGD were a local trader, government miller representative (WKR), NIB representative (Scheme Manager), and County Government official. The discussion sought to address issues related with the rice value chain, market access challenges among rice farmers, level of commitment by Government agencies in ensuring farmers get entry in to high value markets, level of farmer awareness on market requirements, and other factors limiting farmers access to profitable

markets. Various tools were used to gather information; among them were chain maps, cropping calendars, causal diagram, SWOT analysis matrix, and Stakeholders matrix. Pic 3.2.2.6 shows the researcher conducting FGD at Ahero.

Pic 3.2.2.6 Focused group discussion at Ahero boardroom.



3.3 Data Analysis and presentation

Data collected from the survey was subjected to analysis by use of cross tabulations, stacked bar charts, pie charts and chi - square test under the SPSS statistical package to establish the relationships between small-scale farmers who sell produce through formal and informal chains. Qualitative data from the case study was processed into transcripts. The findings were processed into results through answering the research questions. Stakeholder matrix was used to identify the actors and stakeholders and their roles in the chain including the constraints that they encounter. Value chain map for the rice sub-sector was used to identify information flow, product flow and the overlays of the chain. Value share analysis was used to indicate how the rice value shares are distributed among the various actors in the chain. Data collected from informal chain farmers was compared with informal participants and later discussed during FGD to deduce the differences and possible attributes.

Causal diagram was also used to analyse the problem, and causal effect among the rice producers in Ahero irrigation scheme. The PESTEL tool was used to analyse the business environment of the rice chain for possible institutional constraints. SWOT analysis was also employed to identify internal and external factors affecting the rice value chain.

3.4 Ethical consideration

This study was conducted in accordance with “the code of ethical conduct for research” at Van Hall Larenstein University of Applied Sciences. The respondents were informed about the purposes, significance, methods of conducting the research and anticipated benefits before interviews were conducted. Participation of respondents was voluntary and Interview consent was sought orally. Respondents were assured of confidentiality of information provided, and their privacy was respected.

3.5 Limitations of the study

During the period of data collection, there was heightened political activity in the study area with the General elections in Kenya being held in August. Political rallies dominated the better part of the region, with violence reported in some areas. Some of the farmers were involved in political activities especially the farmer leaders. The researcher had to observe utmost care during travels and rescheduling of appointments with informants where it was deemed necessary. However, the information gathered was adequate for this study.

CHAPTER 4: RESULTS OF THE STUDY

This chapter presents two sections; the first section is field survey collected from respondents in Ahero Irrigation Scheme. The second section presents results of the case study involving interview of key stakeholders in the rice sub sector and actors in the rice value chain. Results are presented based on the two formed clusters i.e. formal chain and informal chain rice farmers, specifically highlighting differences from their response. Findings from the case study are presented with chains maps, stakeholders' analysis, causal diagrams, and analysis tables while findings from the survey are presented using tables, stacked bar charts and bar graphs.

4.1 Survey findings (n=30)

4.1.1 Relationship between demographic, Socio-Economic Characteristics and market access.

This section presents demographic and socioeconomic features of the respondents, in which factors such as age, gender, marital status, education level, number of family members, experience in rice farming, and off-farm income are shown.

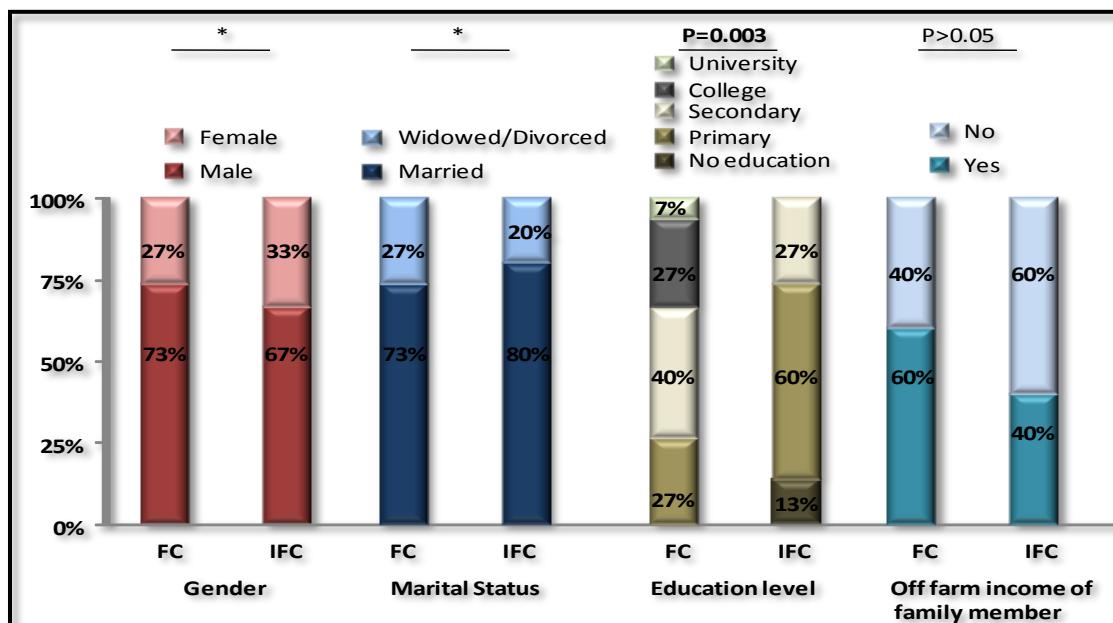
Table 4.1.1: Mean (S.E. and S.D.) of age, number of children, experience and off farm income of farmers from the formal and informal chain groups. T-test compared the two groups.

Factor	Formal Chain			Informal Chain			P-value
	Mean	S.E.	S.D.	Mean	S.E.	S.D.	
Age (Years)	51.7	2.4	9.4	50.8	2.2	8.7	0.780
Number of Children	6	0.5	2.0	6.2	0.7	2.6	0.818
Experience (Years)	17.3	3.1	12.0	17.9	2.8	10.6	0.890
Off farm Income (Kshs)	31466.0	5818.5	22535	16333.3	3217	12459	0.060*

Source; survey data, 2017.

Figure 4.1.1: Stacked bar charts showing the difference in percentage distribution with respect to gender, marital status, education level and off farm income of family member(s).

* indicates that the groups could not be compared statistically.



Source; Interview respondents, 2017.

There is a significant difference between the education level of farmers in the two clusters ($P<0.05$), with the majority of the farmers supplying the formal channel having attained secondary school education (40%) while majority of informal chain farmers have attained primary level education (60%). It can also be noted that majority of the farmers in formal chain have other sources of income (60% of respondents) compared to informal chain farmers (40%).

4.1.3 Relationship between Production, marketing aspects and market access

This section presents aspects relating to production and commercialisation of rice in Ahero Irrigation Scheme. Aspects such as production area, output per acre, production costs, gross revenues, rice buyer, price determination, paddy transport, and constraints to accessing formal channel are presented.

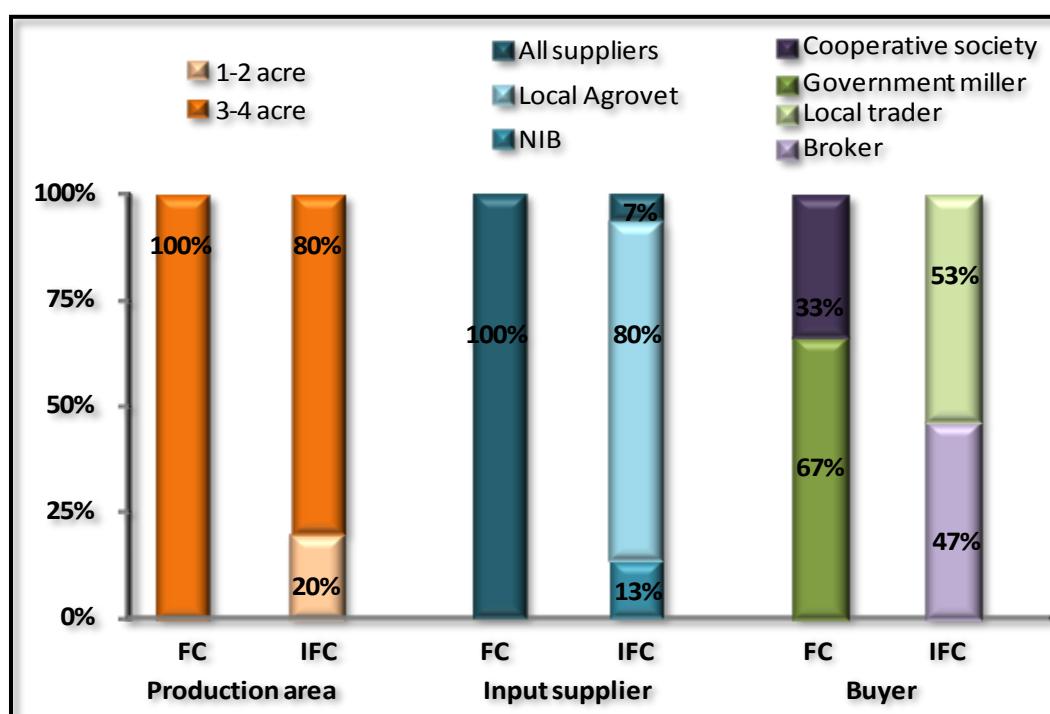
Table 4.1.3: Mean (S.E. and S.D.) of average output (per acre per season), Production cost (per acre), gross margin, buying price and transport cost (per 80 kg) of farmers.

Factor	Formal Chain			Informal Chain			P-value
	Mean	S.E.	S.D.	Mean	S.E.	S.D.	
Average output/acre/season	21.8	0.60	2.34	21.7	0.92	3.58	0.933*
Production cost/acre	23233.3	496.2	1922	23486.6	562.3	2177.7	0.738
Gross margin	49342.6	2141.4	8294	36524	2598	10061	0.001
Buying Price (Kshs)	42	0.0	0.0	34.7	0.16	0.61	0.000*
Transport cost/80 kg bag	22.6	2.12	8.21	45	3.93	15.2	0.000

*Mann Whitney U Test was used, as data were not normally distributed.

Source; survey data, 2017.

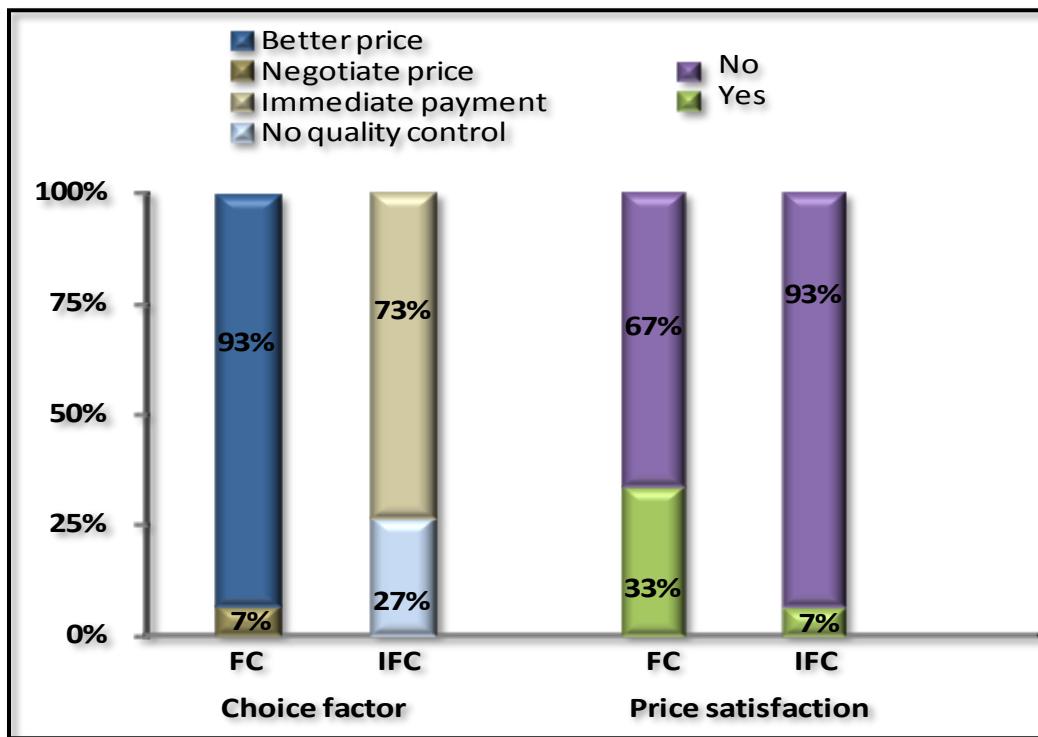
Figure 4.1.3a: Stacked bar chart showing the difference in percentage distribution among Formal chain (FC) and Informal Chain (IFC) group farmers concerning the production area, input supplier, and buyer.



Source; Interview respondents, 2017.

From the tests, there is a significant difference between Informal chain farmers and formal chain farmers with regard to Gross margins ($P=0.001$); higher GM mean for formal farmers at Kshs. 49342.6 per season compared to Kshs. 36524 for informal suppliers. Buying prices are also different for the two channels (Kshs. 42 and 34.7), at $P=0.000$. About transport, informal chain farmers incurred higher transport costs per bag ($P=0.000$).

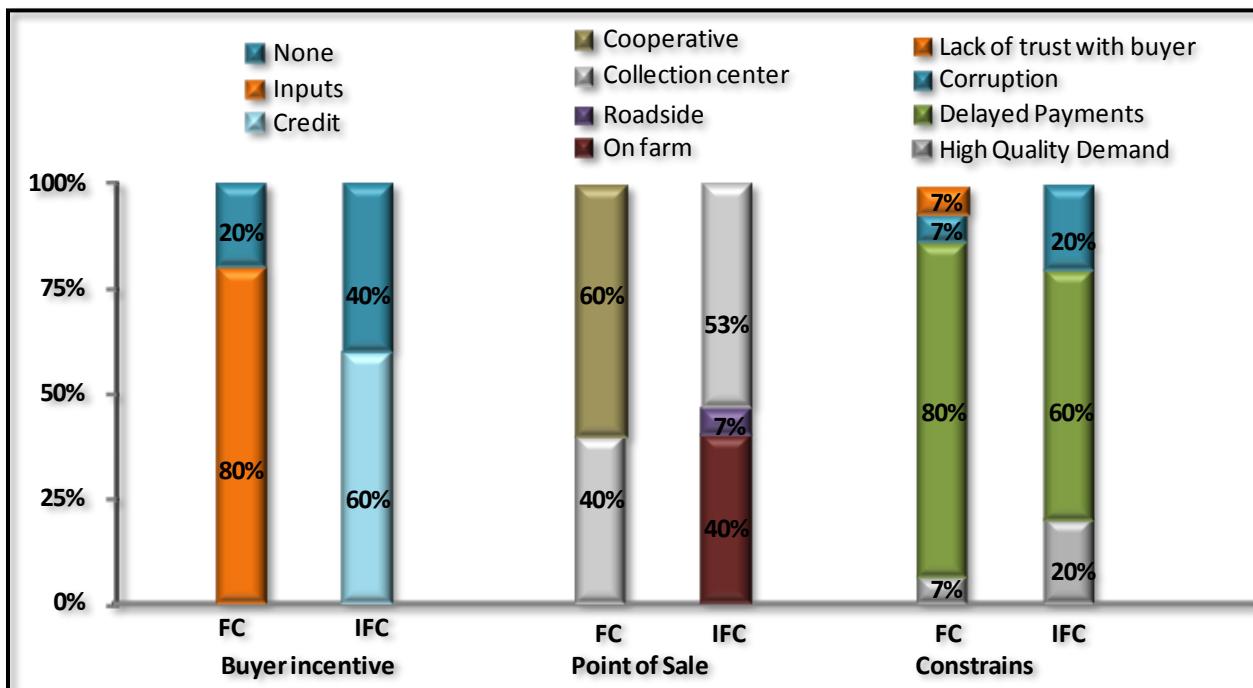
Figure 4.1.3b: Stacked bar chart showing the difference in percentage distribution with respect to choice factor for buyer and price satisfaction.



Source: interview respondents, 2017

High price drives the respondents in the formal chain to choosing (93%), and they are majority are satisfied with the price (67%), whereas in the informal chain majority are driven by immediate payments from buyers (73%), with most of them not satisfied with price (93%).

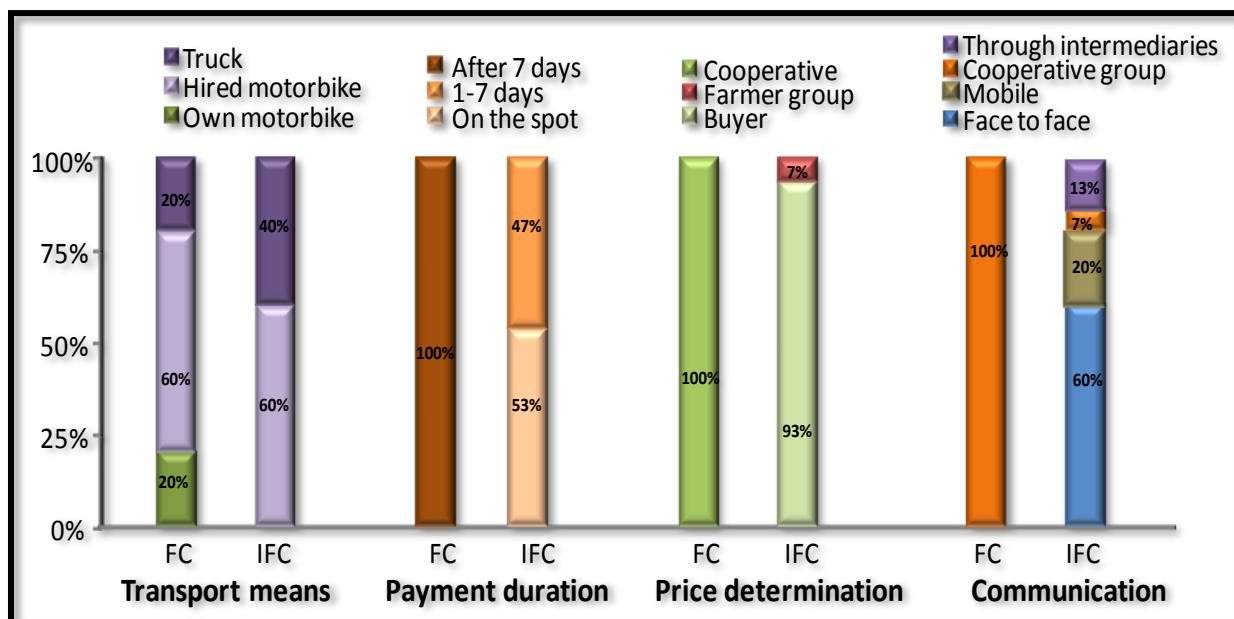
Figure 4.1.3c: Stacked bar chart showing the difference in percentage distribution with respect to buyer incentive, point of sale, and main constrain in choosing the formal market.



Source; Interview respondents, 2017.

Majority of the farmers in both chains identified and ranked delayed payments as a key constraint (80 and 60% respectively). Corruption and high-quality demand ranked second with an equal number of respondents.

Figure 4.1.3d: Stacked bar chart showing the difference in percentage with respect to transport means, payment duration, price determination and communication.



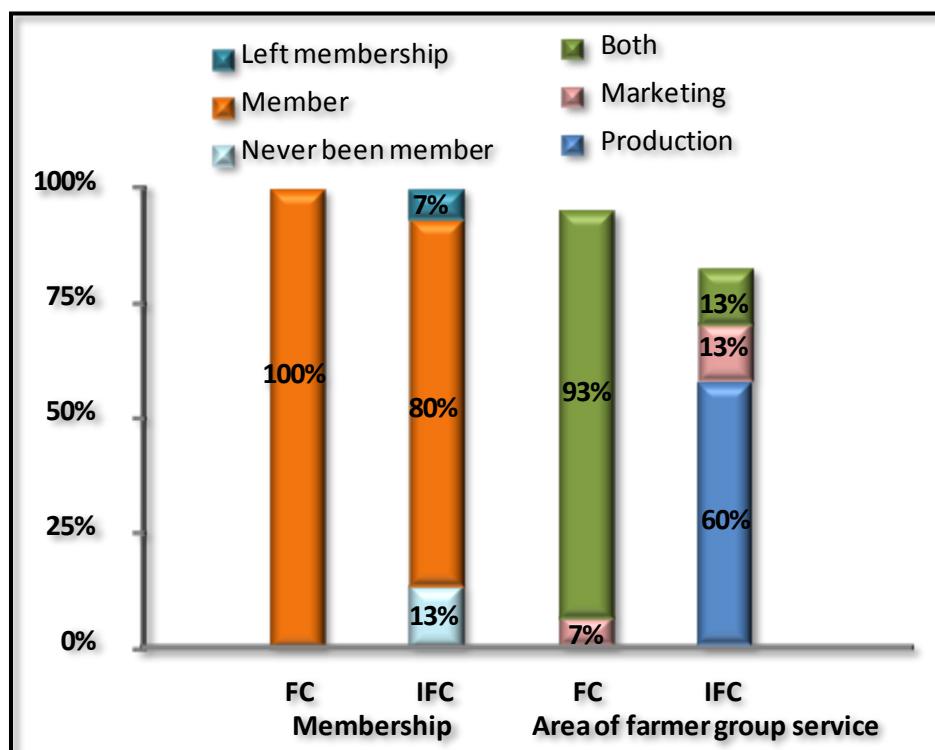
Source; Interview respondents, 2017.

Hired motorbikes are the preferred means of paddy transport from farms in both chains (60%), but the time of payment is different in both channels. All respondents in FC are paid after seven days, while IFC are paid on the spot or less than seven days. Majority of farmers in both channels communicate face to face with traders (60 and 100% in both chains).

4.1.4 Relationship between Institutional factors and market access

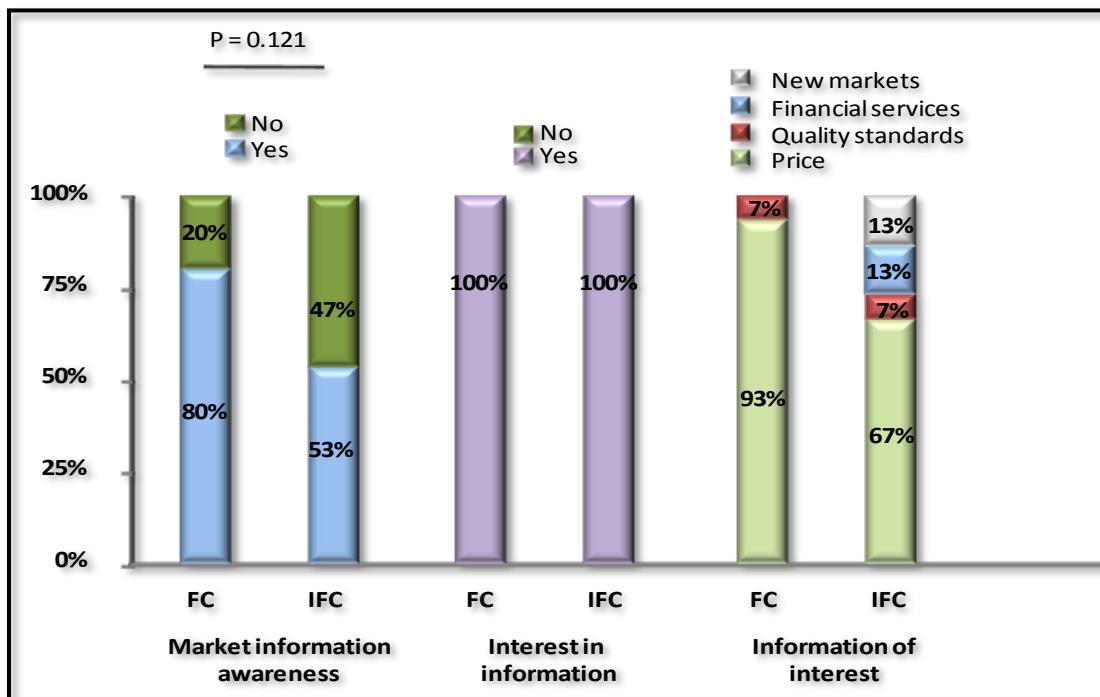
In this section, the importance of institutional factors within the rice subsector in Ahero irrigation scheme is shown. Institutional roles are analysed by the involvement of rice farmers in accessing information, participation in farmer groups or cooperatives, and distances to markets.

Fig.4.1.4a Stacked bar chart showing the difference in percentage distribution with respect to membership to a farmer group, and group speciality.



Source; Interview respondents, 2017.

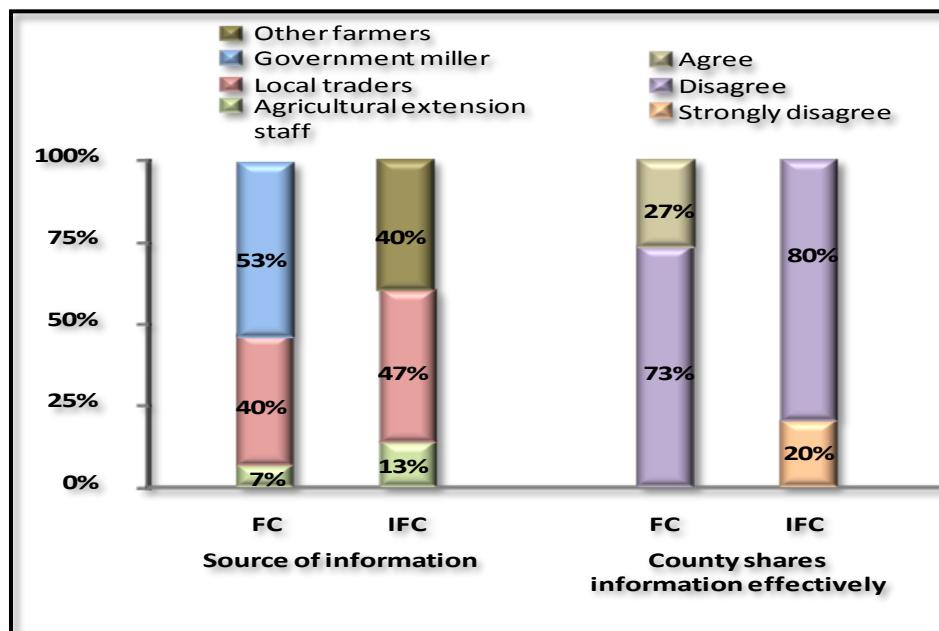
Fig. 4.1.4b stacked bar chart showing the difference in percentage distribution with respect to market information awareness, whether they are interested in market information and specific information interested.



Source; Interview respondents, 2017.

There was no statistical difference in the level of information awareness between the two clusters ($P>0.05$). Traders are the main source of information in both channels at 40 and 47% respectively.

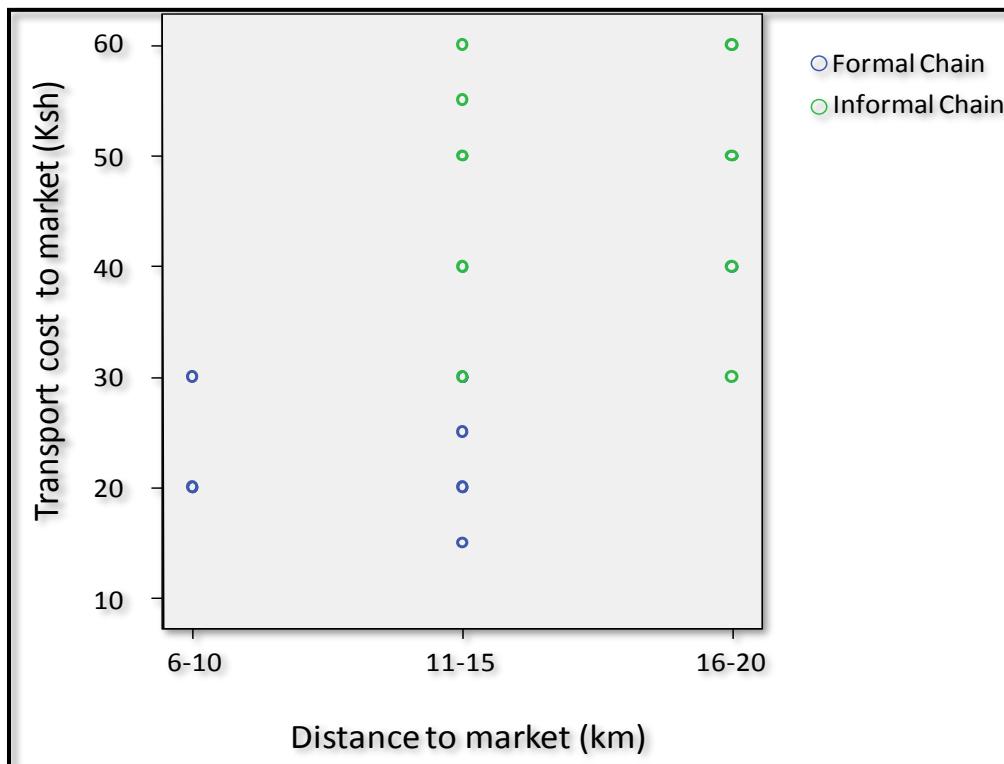
Fig. 4.1.4c Stacked bar chart showing the difference in percentage distribution with respect to sources of information, and the degree of agreement on county sharing information.



Source; interview respondents, 2017

Majority of the respondents in both chains disagreed with the county information-sharing platform, at 73 and 80% in Formal and informal chains respectively.

Fig. 4.1.4d Scatter plot showing the difference in percentage distribution among Formal chain (FC) and Informal Chain (IFC) group farmers with respect to their distance to market.



Source; Interview respondents, 2017.

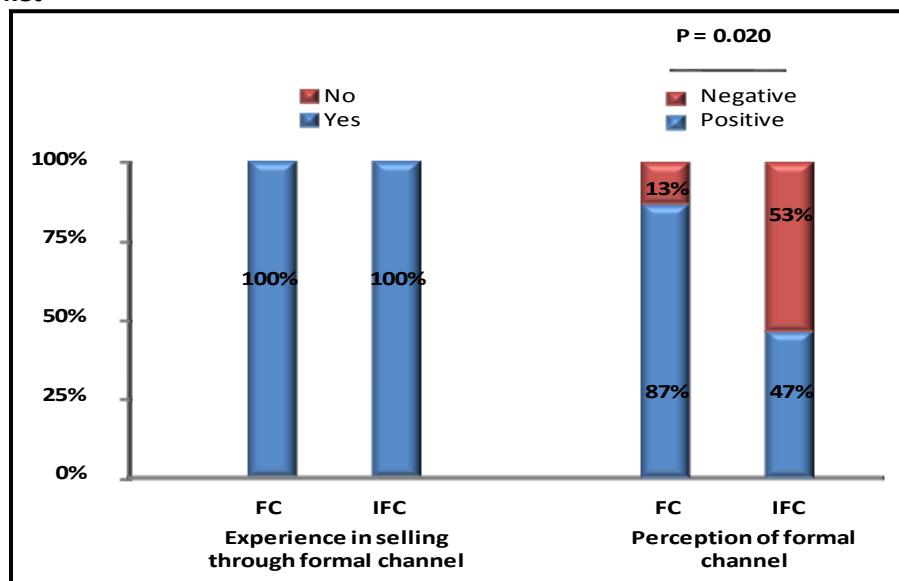
Majority of the farmers in both clusters reached their respective markets within 11-15 km.

Data is normally distributed for the transport cost. T-test ($p<0.001$) and there is a positive correlation between the distance to market and transport cost ($r=0.48$, $p=0.016$).

IFC respondents incur higher transport costs than respondents in the FC. Mean transport cost of formal group = Kshs. 26.0, Mean Transport cost of informal group =Kshs. 47.0

4.1.5 Perception of respondents on formal marketing channels

Fig. 4.1.5 Stacked bar chart showing the difference in percentage distribution with respect to perception of formal market

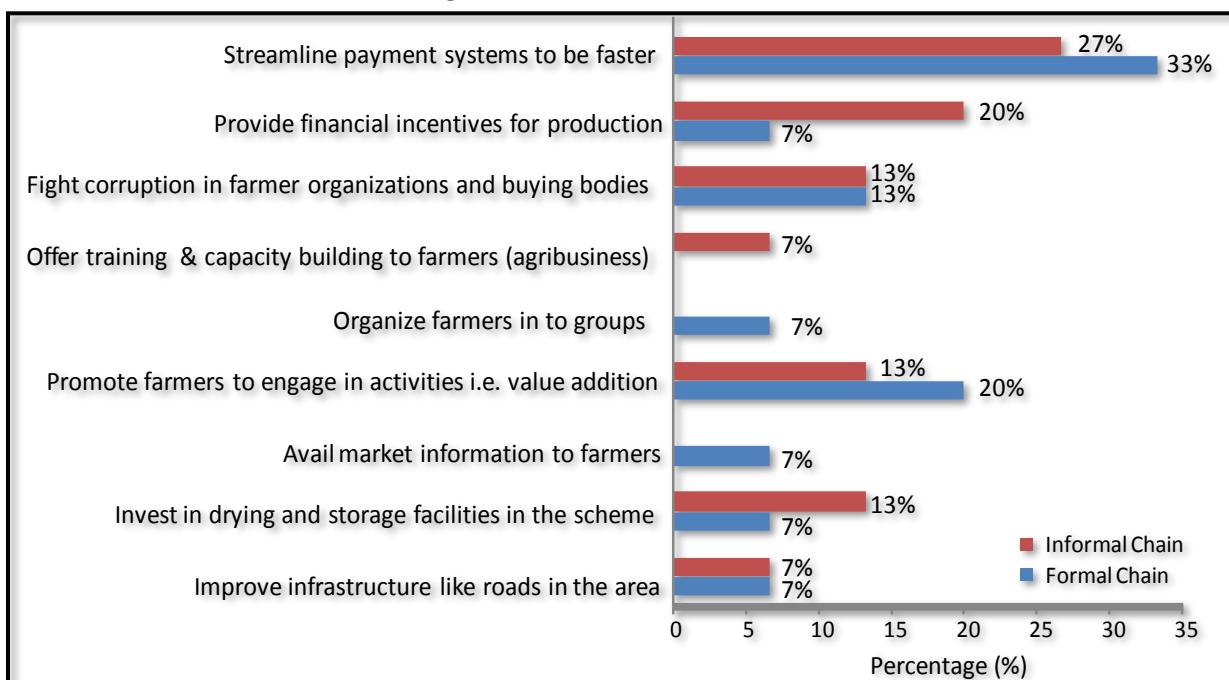


Source; Interview respondents, 2017.

All the respondents have experience in selling through the formal channel, but their perception on the formal channel is different. 87% of respondents had positive experience, while 53% of the farmers in the informal chain had negative experience

4.1.6 Improving formal market access amongst rice farmers

Fig. 4.1.6: Farmers' response on what they think the Government and other stakeholders can do to enhance formal market access among rice farmers.



Source; Interview respondents, 2017.

Both clusters of farmers identified streamline of paddy payments as the most critical aspect in addressing market access. The least mentioned is organising farmers in to groups and training of farmers (7%).

4.2 Case study:

From key informant interviews, information on institutional roles, revenues and transaction costs along the chain, opinion on constraints faced by farmers in accessing formal markets and possible strategies are presented. From FGD, findings on the operating environment of the rice sub-sector, paddy rice marketing channels, stakeholders in the rice subsector within the scheme, constraints to formal chain access by farmers, and strategies for formal market access are presented using descriptions, chain maps, causal diagram, and tables.

4.2.1 Rice-sub sector situation in Ahero Irrigation Scheme

From the interview with DGM (NIB), it revealed that there are about 588 rice farmers in Ahero Irrigation Scheme producing rice in an area of 2,168 acres. An in depth interview with the Deputy General Manager (Operations) showed that most of the farmers are tenants holding 1.6ha each. They have no formal ownership but tenancy allocated by Government for the sole purpose of rice production. From the discussion with cooperative society officials and confirmed during FGD, The current production status of the scheme is summarised in the table below;

Table 4.2.1: production status in Ahero Irrigation scheme

Irrigation scheme	Area (Ha)	Annual Output (MT) - 2016	Gross Value (Million Kshs)	Number of Farmers
Ahero	867	3200	122	588
Total	867	3200	122	588

Source; NIB, 2016

4.2.2 Stakeholders in the Rice Value chain within Ahero Irrigation Scheme

FGD held at Ahero irrigation scheme generated a list of rice value chain actors, supporters and influencers. A stakeholder analysis matrix was used to collect information and later presented in the narrative below.

4.2.2.1. Actors in the rice value chain in AIS

- Input suppliers:** NIB, NCPB, Local agro vet dealers were identified as key suppliers of inputs to farmers. Once the farmers receive the cropping calendar, the groups, cooperative and individual farmers place orders to the respective suppliers for inputs needed. NIB is the sole supplier of certified rice seed to farmers in the scheme. NCPB supplies subsidised Government fertiliser to farmers organised in groups. Local Agro vets who are many supply fungicides and pesticides. Local input dealers were found to be lending some farmers inputs on credit to be repaid at harvest time.
- Producers:** 588 Small-scale rice farmers participate in rice farming according to NIB register of farmers. They are registered with NIB to hold land in trust and grow rice in the designated area. Each farmer allocated 4 acres. As population and families are growing, land sub-division is evident and new farmers are getting to own small portions of land. The farmers belong to different rice production self-help groups and cooperative society, with the majority of them being in SHGs. According to cooperative society register, 183 farmers are members.
- Collectors:** 30 smallholder rice self-help groups and 1 Cooperative (Ahero Cooperative society) are the main rice collectors for farmers produce. They aggregate and sell to Government millers namely WKRM, LBDC, and NCPB. They also assist the farmer in bulk purchase of inputs as well short term lending of loans for production purposes.

- 4. Traders:** From the FGD, several traders participate in the rice value within the scheme. Jay Jay traders, Andiego traders, and KEDRA millers were notably the most common traders. Other small traders with mills present are also present in the area. Several brokers operate within the scheme and buy rice on behalf of traders. All traders were identified to be supplying rice through the informal chain. Farmers identified traders to be the main source of information especially on price and quantity.
- 5. Processors/Millers:** millers majorly control both the formal and informal chain. In the formal chain, the main processors are WKRM, NCPB, and LBDC. They have a capacity of over 3500MT/hr. Local traders in the informal chain have a limited capacity of up to 80MT/hr. Government processors buy rice from cooperative society and sell milled rice majorly to supermarkets. Millers in both chains also perform the function of wholesaling.
- 6. Retailers:** Nakumatt, Uchumi, Chopies, Tusky, Cereal traders and several retail shops present, dealing with many other household goods. Open-air markets also dominate the milled rice area especially on the road to Kisumu town. Buy rice from wholesalers and millers in the area. Operate big to small shops and outlets. Pack rice into small quantities and Sell rice to consumers in the country side and cities. Retailers in towns were observed to be more concerned with packaging and quality, whereas rural retailers were selling in small packages measured in kilograms at the shop.
- 7. Consumers:** Rural, urban and institutional consumers are the key consumers of rice in the region. Kisumu city has a large population according to County Government records, hence the bulk of rice being produced are consumed here.

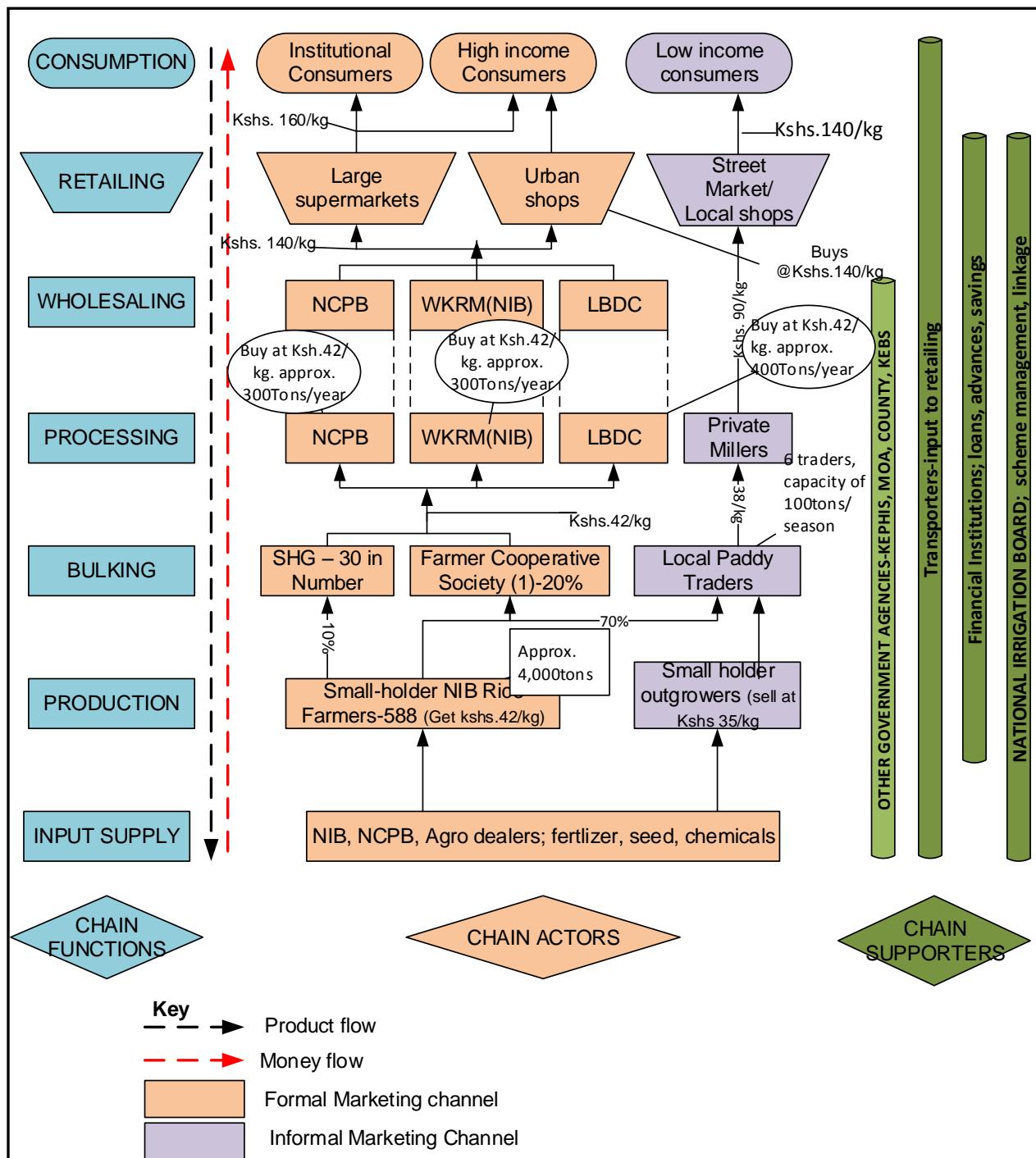
4.2.2.2 Supporters and Influencers in the rice value chain in AIS

- 1. National Irrigation Board (NIB)** - Government agency under the ministry of water and irrigation: The stakeholders said the agency is central to the existence of the scheme through its management and investments. The agency has the mandate of developing and managing public irrigation, promoting marketing of agricultural produce in schemes and resolving land disputes. It is the custodian of irrigation scheme land to which portions were allocated to farmers. It is central in the coordination of the rice chain because it has invested in a mill and at the same time providing essential services to farmers.
- 2. County Government of Kisumu:** Headed by the Governor, the county is critical in legislation, policies, and regulation of trade in the region. It also supports farmers through extension services, cooperative oversight roles, as well as maintenance of roads and related infrastructure in the county. They work in close collaboration with NIB.
- 3. Kenya Bureau of Standards (KEBS):** Ensure compliance with quality and standards at all levels of the chain; from producers to retailers. For the safety of products. Also, ensure accurate measures adhered to through accurate weights by traders.
- 4. Financial institutions:** Local banks-KCB, Barclays, Equity, Cooperative bank and National bank. Provide financial services to farmers, traders, millers, wholesalers, and retailers.
- 5. Transporters (own motorbikes and trucks):** Transport rice from farms to traders and millers. Also, milled rice transported to wholesalers and retailers.

4.2.2 Rice chain map

Stakeholders participating in the FGD were tasked to come up with a visual presentation of the chain map with overlays depicting the status of rice marketing in the scheme. Two main channels were identified; Formal Government controlled chain and the informal chain majorly controlled by traders and brokers. Description of the two channels is shown below.

Fig. 4.2.2 Existing Rice chain map in Ahero Irrigation Scheme



Source; FGD, 2017.

4.2.3 Characteristics of the marketing channels as discussed at FGD

- Formal marketing channel:** As observed in the rice chain map, farmers in the formal chain receive Kshs. 42/kg for paddy delivered to cooperative or self-help groups (SHG). This is higher than informal chain farmers by Kshs. 7.00/kg. From survey findings, farmers in this chain are motivated by higher price and therefore cooperative and groups deliver to Government millers. This channel

commands only 30% of total production in volume. The millers are mainly Government owned namely WKRM, NCPB, and LBDC, who do both processing and wholesaling at their factory premises (see pic of branded rice from WKRM). From the interviews with LBDC manager, this channel has strict quality standards that must be met before procurement of paddy from suppliers. High-end consumers and institutions are the main consumers of this channel and are willing to pay a high price for quality rice.



2. **Informal marketing channel:** This channel commands a larger volume of paddy rice traded in Ahero Irrigation Scheme, at 70%. Both scheme farmers and out grower farmers are involved in this chain, with both getting Kshs. 35 per kg of paddy delivered to traders. Majority of the farmers in this channel sell at farm level characterised by low price, low-quality demand, and no standard weights for measuring paddy bags. Private millers have limited capacity with interviewed trader running a mill with a capacity of only 80mt/hour, which is much lower compared to Government miller of 3500mt/hr. Local shops and street vendors dominate retail section of the chain, with low-income consumers being the major consumers.(Pic above showing local rice vendor in Ahero).



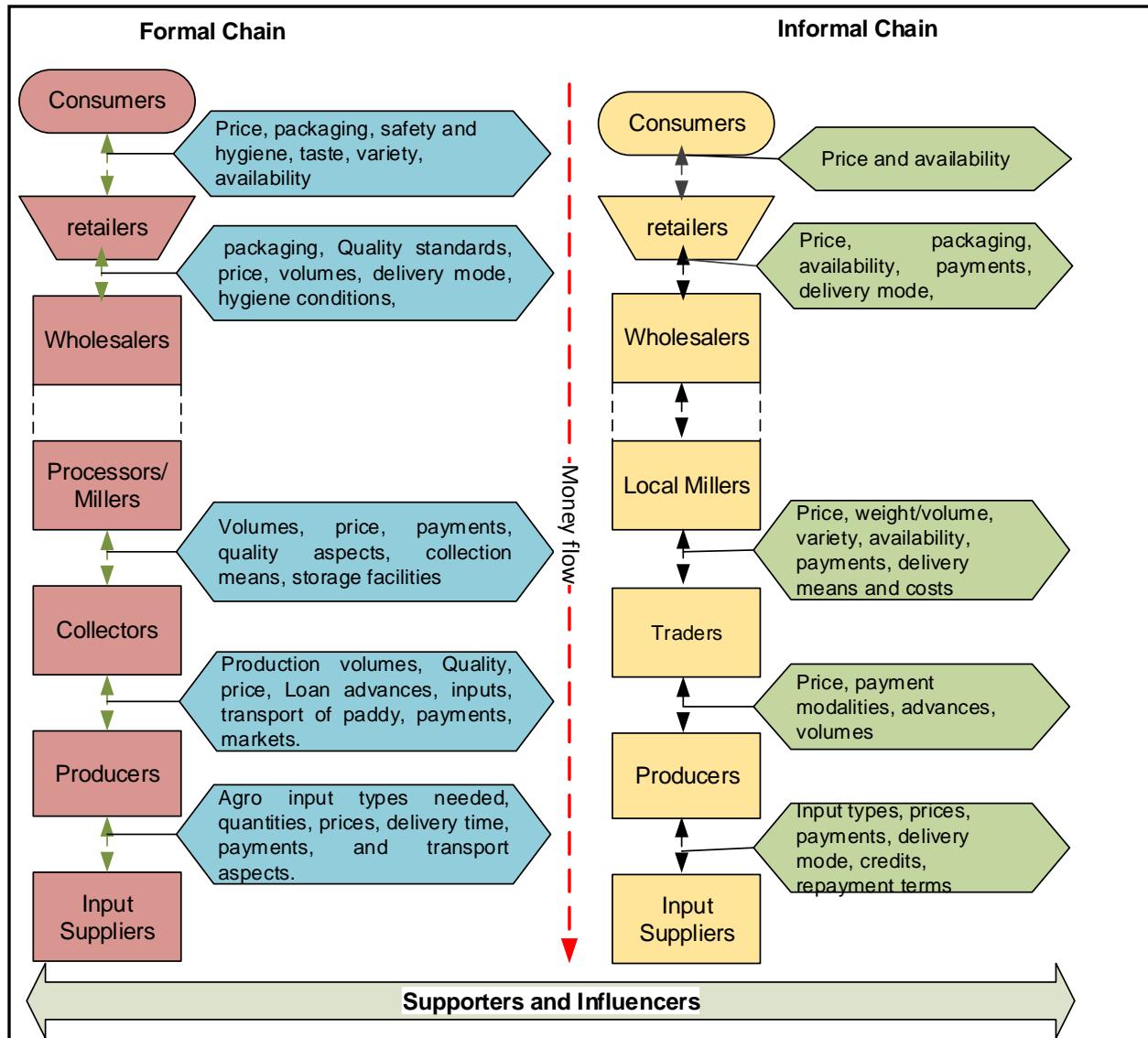
4.2.4 Information flow along the Rice value chain

From the FGD, it was established that there are five main sources of information for rice farmers: government extension officers, local traders/buyer, fellow farmers, cooperatives and groups, and Government millers. Majority of the farmers have information particularly on price and markets. Of interest here is that approximately half of respondents depended on the local traders/buyer as their source of market information. Both the formal and informal chains got information majorly from traders and this was expressed during FGD by the stakeholders. Traders compete for rice in the scheme and hence reach farmers' fields even before rice is harvested.

Information flow is bi-directional between adjacent actors but not across all the actors in the chain for example only between traders and farmers. There is also information flow from chain supporters, extension workers who provide advisory and research information to farmers, NIB, KEBS, Transporters, and financial institutions. Marketing information is by word of mouth-face to face interaction with potential buyers. NIB and ministry of Agriculture organise field days whereby farmers and other stakeholders share information.

From observation and as expected, majority of the farmers own mobile phones and they can easily contact each other especially on meeting buyers. Traders find it easy to call farmer leaders to ask available volumes for sale as well as prices, this saves on travel costs and time.

Fig. 4.1.5 Information flow along the rice value chain in Ahero



Source; FGD and Key informant interviews, 2017.

4.2.5 Revenues and Transaction costs along the chain

4.2.5.1 Actor value shares and Gross margins

In order to get an indication of the value shares and gross margins of the actors in formal and the informal chain, gathered data Government miller (LBDC), and the interviewed local trader (Jay Jay),) were used to calculate gross margins and value shares. The parameters used are as described below:

- Gross output –value of what is produced by the business activity
- Variable cost (direct costs)-cost that directly related to the amount produced
- Gross margin (gross profit/loss)- gross output minus variable costs
- Gross margin (GM) - Selling price minus variable costs as a percentage
- Added value- revenue-previous actors revenue
- Value share – added value as a percentage of retail value

The respondents easily supplied data on variable costs and revenues. Fixed costs varied widely and it was not possible to get the cost of investments in irrigation infrastructure, government mills as well as accessing fixed costs of retailers. Summary of results is presented in table 4. 10 and 4.11

Table 4.2: Value shares and gross margins of actors in the Formal rice value chain

Prices are in Kshs. Per kg of rice, harvest season, 2017.

Chain Actor	Variable costs (R)	Revenue (selling price) SP	Gross Income R-VC	Added value (R- Previous Actors Revenue)	Gross margin Gross Income/Revenue*100	Value Share Added value/Retail Price*100
Farmers	23.00	42.00	19.00	42.00	45.2%	26.25%
Processors	89.00	140.00	51.00	98.00	36.4%	61.20%
Retailers	144.00	160.00	16.00	20.00	10%	12.50%
Total				160.00		100%

Source: Key informant interviews (LBDC, Trader) and FGD, 2017. All figures for prices are in Kshs. Except where indicated.

The above table 4.2 shows variable costs, revenues, gross margins and the value shares for the different actors in the formal rice value chain in Ahero Irrigation scheme. The farmers are getting a gross margin of almost 45.2% and value share of 26.2% despite the risk and costs they have to bear in this rice business. They do not pay for land rent but given free by Government, hence the high margins. Government processors have highest value shares showing that they take the greatest risk in buying bulk paddy from farmers and investing heavily in the milling plants. The consumers are paying Kshs. 160 for 1kg of milled white rice.

Table 4.2: Value shares and gross margins of actors in the Informal rice value chain

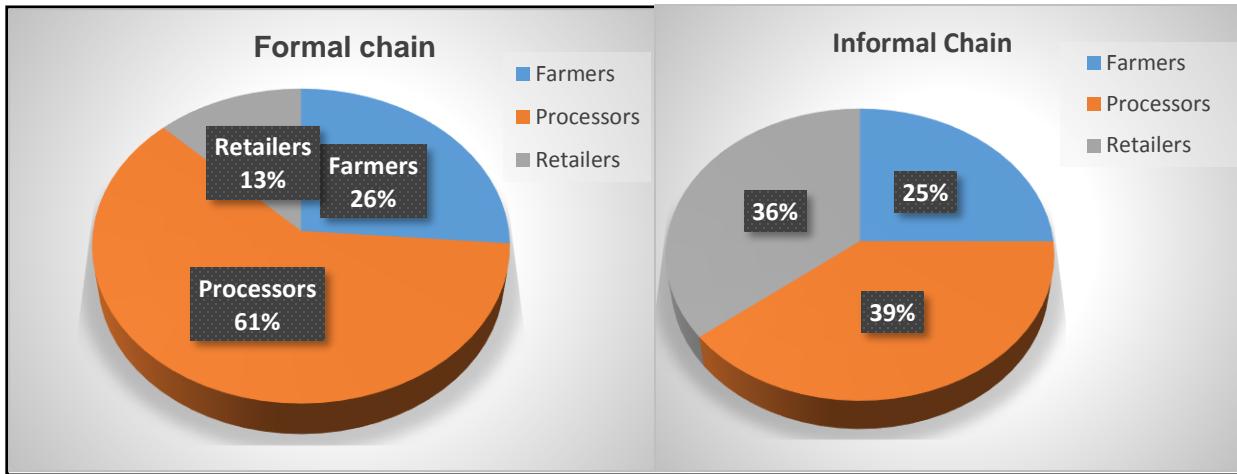
Prices are in Kshs. Per kg of rice, harvest season, 2017.

Chain Actor	Variable costs	Revenue (selling price) SP	Gross Income R-VC	Added value (R- Previous Actors Revenue)	Gross margin Gross Income/Revenue*100	Value Share Added value/Retail Price*100
Farmers	26.00	35.00	9.00	35.00	25.7%	25.00%
Processors	55.00	90.00	35.00	55.00	38.8%	39.20%
Retailers	104.00	140.00	36.00	50.00	27.6%	35.70%
Total				140.00		100%

Source: Key informant interviews (LBDC, Trader) and FGD, 2017. All figures for prices are in Kshs. Except where indicated.

As depicted in figure 4.2 the farmers have the lowest value share of 25% in the chain reflecting the amount of costs and risks that they have to put in the chain compared to the other actors. The processors have 39% value share because they invest a lot regarding looking for paddy and risking quality aspects. They also incur costs of transporting to their premises. Retailers invest very little in to the business hence their share is lower than processors. Consumers in this chain pay Kshs.140.00 per kilogram of milled white rice

Fig. 4.2 Pie chart showing the percentage value shares in formal and informal chain



Source; Key informant interviews (LBDC, Trader) and FGD, 2017

Farmers in the informal chain incur higher variable costs than their counterparts in the formal chain. As it was revealed in FGD, informal chain farmers engage in unofficial money lending scheme with the brokers and local traders and this happens mostly during harvesting. Farmers are advanced on average Kshs. 2000 per acre by the traders for harvesting their crop, and once harvested the farmer has to repay the trader with one bag of rice weighing 80kg. One bag at market rate sells at Kshs. 2,800 (informal chain), meaning the farmer loses Kshs. 800 per bag as added cost. This translates to almost 40% interest, and if farmers had taken a loan through official banks and lending institutions, interests would have been up to 12%.

4.2.6 Product Characteristics preferred by formal Marketing channels

Interviews conducted with LBDC manager showed that Government controlled millers who are the main processors in the formal channel demand high-quality paddy from farmers. This was discussed and confirmed by stakeholders at FGD. Majority of farmers in the scheme prefer to sell their paddy at the farm to buyers who are not concerned about standards. LBDC, WKRM and NCPB had similar requirements for paddy before being delivered to their stores. Paddy rice requirements (Quality standards) are summarised below:

- Moisture content; 13-14%
- Impurities not exceeding 2%
- Premature content not exceeding 4%
- Also check colour (golden), chalkiness and internal cracks (use crushing moisture meter).
- Farmers find it very difficult to meet quality standards and most of them prefer selling to brokers who buy at high moisture content with many impurities.

Many farmers have the challenge of meeting the requirements as both harvesting and drying is manually done. In some cases farmers harvest during rainy season, hence drying and avoidance of impurities is very difficult.

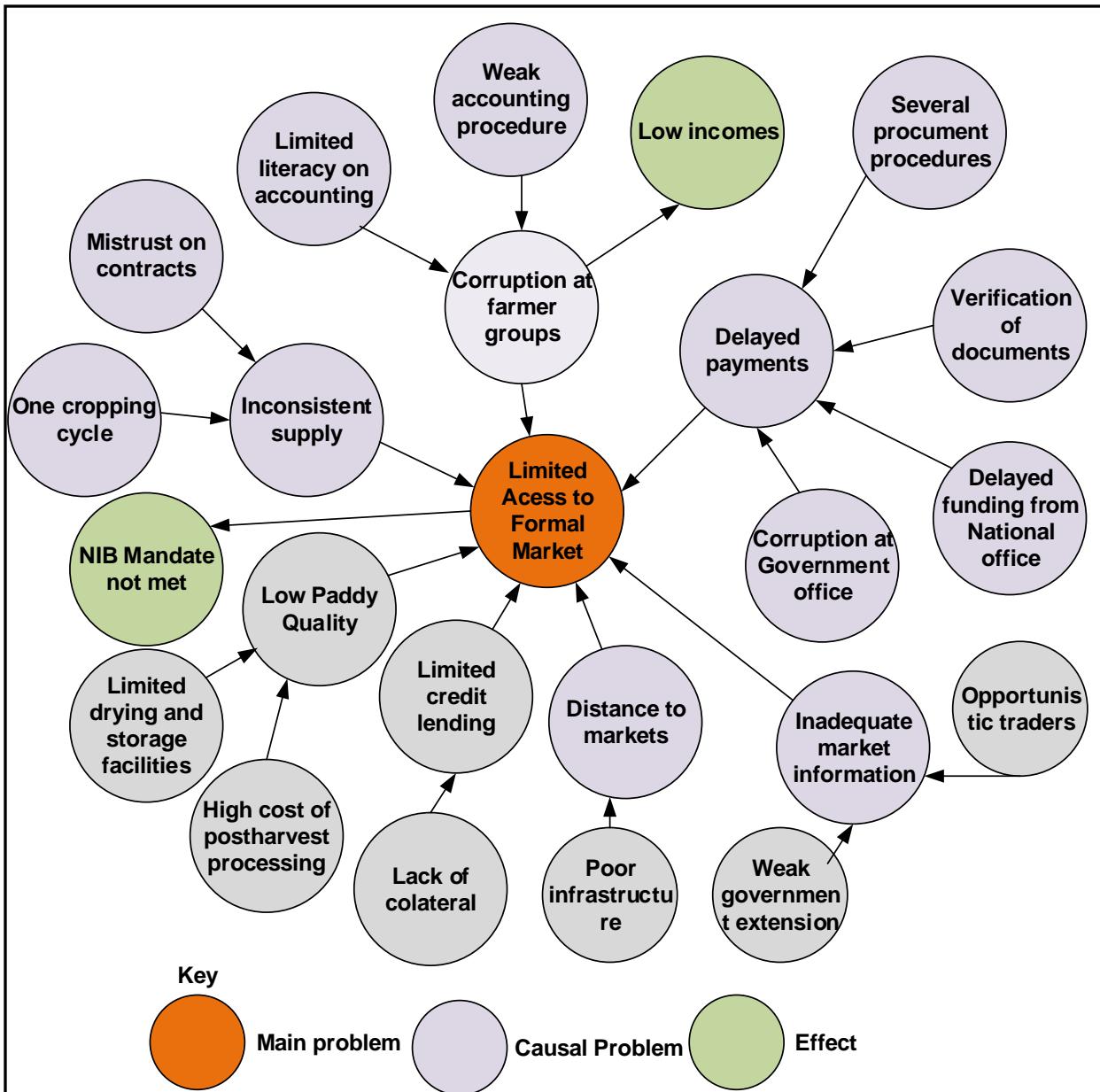
Pic. 4.2.6: Drying rice for WKRM in Ahero. Left: paddy and milled rice on display at WKRM.



4.2.7 Constraints on Formal Market access

Using causal diagram, stakeholders at FGD revealed that formal market access is majorly constraint by delayed payments of paddy delivered to the government millers, contrary to the expectation that quality and limited information are key constraints. The government millers pay after seven days and sometimes more than one month and hence farmers shy away from supplying them due to immediate need for money. Corruption within farmer cooperative and groups was the second mentioned constraint, and farmers highlighted cases of their funds missing or misappropriated by officials. Other constraints are shown in the causal diagram below:

Fig.4.2.7: Causal diagram for the rice value chain in AIS



Source; FGD, 2017.

NIB expressed concern of realising its mandate of promoting the marketing of crops grown in the public irrigation scheme. From the FGD, majority of the farmers default in the payment of Operation and maintenance fees to NIB, hence hampering service provision, for instance timely provision of irrigation water, maintenance of scheme canals, roads and structures. The cooperative society members are deducted the fee up front during payment hence there is limited default in meeting their obligations to NIB and credit lending institutions.

4.2.8 Accessing formal market strategies

LBDC Manager said farmers could access their market through utilisation of the already established warehouses within their premises. Of major interest is that East African Grain Council has certified the stores, and recently issued with a certificate. From the FGD, the stakeholders and particularly the County Government of Kisumu said they are willing to set funds as a revolving kitty whereby farmers can store their entire paddy at the warehouses and the fund pays them at current market price. Once LBDC or any other government buyer is ready to buy, they can pay the County fund and collect rice. Alternatively, the farmers can be issued with a voucher showing their paddy quantity and value in the warehouse, and they can use it to access advance payments as they await final purchase.

Pic. 4.2.8: LBDC General Manager showing certificate of warehouse certification to researcher



The Deputy General Manager in charge of operations at NIB said farmers in Ahero Irrigation scheme were shareholders in Western Kenya Rice Mills, a subsidiary company of NIB. Before liberalisation of agricultural markets, farmers through their society could deliver all rice for milling and they are paid for paddy delivered. Later on after liberalisation and following the collapse of cooperative in 1997, the farmers could not continue with the system. The manager suggested upgrading farmer's activities so that they add value to rice through the WKRM by allowing them to buy shares and co-own the operations through their revived cooperative. During FGD, stakeholders supported the idea and pledged support to the society in helping farmers upgrade their activities for better value.

Traders are willing to buy rice through the formal channel if Government regulates imported rice, to who they say are the greatest competitors to them, yet the imported rice is of low quality. They recommended government control on prices and quality by streamlining marketing policies across the sector to safeguard their interest. Moreover, they request for higher taxation of imported rice so that price is comparable to locally produced rice. KEBS should also train and sensitise the traders and retailers on quality standards and be able to work in partnership with them.

The stakeholders and interviewees said corruption should be fought at both farmer level and government level. Farmer organisations need training and capacity building on financial management with accountability being checked by relevant Government bodies to restore trust amongst farmers. Other strategies suggested included investments in drying and storage facilities at scheme level, support to mechanise harvesting to improve quality, and processing of land lease certificates to farmers so that they can use as collateral while accessing loans for production activities.

4.2.10 Market environment (PESTEC) for the smallholder Rice value chain in AIS

Information from Key informant interviews and FGD are incorporated in tabular form regarding Political, environmental, social, technical, economic and cultural situation in the rice subsector.

Table 4.2.10: PESTEC of the rice value chain in Ahero

SEGMENT	FACTORS
Political	<ul style="list-style-type: none"> Poor road infrastructure in production areas due to limited funding by County Government and National Government Limited-operational quality control systems due to traders evading quality checks, corruption and lack of clear quality guidelines. Cheaply imported rice flooding market due to smuggling and failure by government to impose tariffs and controls at borders. New devolved county Government functions, closer extension services, funds, and regulations of trade. Government and Political goodwill towards irrigation development in the country.
Environmental	<ul style="list-style-type: none"> Flooding from rivers during heavy rains, Nyando River breaks its banks during heavy rainy season, affecting production area. Greenhouse gas emission; paddy fields contribute high greenhouse gasses due to continuous flooding over long periods. Use of pesticides and fertiliser in aquatic environment
Social	<ul style="list-style-type: none"> Increasing population; hence high demand for rice benefiting farmers in Ahero. However, increasing population within the scheme leads to reduced area for rice production. HIV &AIDS disease affecting majority of the population; Kisumu county poses the highest rate of HIV infection (26% as per National Aids Control Statistics), hence majority of the farmers have been socioeconomically affected.
Technological	<ul style="list-style-type: none"> Use of old rice production practices, lack of hybrid rice seed to boost production as well as disease control systems. Use of old pump system for water abstraction hence delayed cropping programs when water shortage is experienced in the scheme Available and cheap mobile telecommunication; access of market information. Most farmers have mobiles.
Economical	<ul style="list-style-type: none"> Budget limitations of Donor agencies and national government High-interest rates on loans hence expensive to borrow High operation and maintenance cost of scheme hence high production costs associated with production per acre Erratic price changes for paddy rice
Cultural	<ul style="list-style-type: none"> Land held in trust by Government, hence no sense of ownership by farmers. Land was communal and its currently being a political issue between farmers and NIB. Farmers want full ownership.

Source: Key informant interviews and FGD, 2017.

4.1.11 SWOT Analysis for the rice value chain in AIS

To identify internal and external factors affecting the rice value chain, SWOT analysis was done during FGD and recorded in a matrix presented below;

Table 4.1.11: SWOT analysis matrix for the rice value chain in AIS

STRENGTH	OPPORTUNITIES
<ul style="list-style-type: none"> • Political stability in Kenya favourable for trade and rice farming • Favorable climatic conditions as well as geographic location of irrigation schemes • Government goodwill in irrigation investment; it is the manifesto of current government to expand area under irrigation and modernise the scheme. • Proximity to Kisumu city; with high population and demand for rice • The Conducive business environment for trade in rice, supportive county Government. 	<ul style="list-style-type: none"> • Increase in number of processing companies and traders • Certification of Government warehouse at LBDC • Devolution of funds through counties, ease of accessibility by local communities. • Government investment in milling companies at high paddy price. • Improved communication through cell phones, easy access to information • Enhanced regional integration (EAC) • Growing urban population, high demand for rice.
WEAKNESSES	THREATS
<ul style="list-style-type: none"> • Weak cooperatives and groups; farmers lack trust with the leaders especially on financial accountability • Unclear marketing policies; withdrawal of state marketing bodies without clear guidelines affected the subsector. • Inadequate incentives for farmers to increase production; no market stability as well as subsidies. • High interests on loans charged by commercial banks making it unaffordable for farmers who do not have collateral. • Weak rice value chain coordination; no clear responsibility and expectation of stakeholders hence competing with one another. • Low price for local rice; stiff competition from imported rice, which are cheap. • Unclear payment policy for farmers from government millers, hence delayed payments. 	<ul style="list-style-type: none"> • Budget limitations of Government and Donor agencies especially on farmer support programs such as extension. • High electricity costs for irrigation; farmers are finding it difficult to meet the cost. • Poor infrastructure in rice growing areas hence high transport costs, with principal means of transport being motorbikes due to inaccessibility by trucks • Cheap imported rice; smuggled rice flood local markets hence affecting farmers • Scepticism about EAC: No clear trade agreements between EAC member states. • Rising input costs; farmers not affording high-quality fertiliser and seeds. • Corruption: both at government offices and farmers organisations • Land tenure system-government owned, denying farmers collateral for loans.

Source; FGD, 2017

This chapter discusses the results of the findings on the status of rice sub sector and specifically highlights the differences between the two marketing channels with regard to accessing formal markets. The discussions are based on results and findings survey interviews, key informant interviews and FGD.

5.1 Rice Production and Marketing in Ahero Irrigation Scheme

National Irrigation Board plays the role of service provision (supporter) and a processor through its subsidiary company (WKRM Ltd) in the rice value chain. It serves over 588 rice farmers in Ahero Irrigation scheme with water provision, operation and maintenance of the scheme, and promoting marketing of crops produced in the scheme. It has a rice mill with a capacity of 3500MT/hr., which is underutilised due to limited paddy supply from farmers, who prefer to sell to local traders and brokers (informal channel). This situation is similar to other formal chain millers like NCPB and LBDC. The study identified constraints that hinder rice farmers from accessing formal markets and strategies to improve market access.

FAO (2014) defines small-scale farmers as having less than 2 hectares of cropland and in Ahero irrigation scheme own small parcels of land in trust (less than 2ha) for rice production activities. The average production per acre is 21bags (1.6tons/acre). This is lower than expected production of 2.5tons/acre. A justification for this drop in figures could be attributed to lack of record keeping by farmers who could not account for rice used for home consumption, or traded on-farm for household goods when hawkers visit their farms. There was inconsistency also between NIB, and ministry of agriculture statistics, but this research used data from national bureau of statistics. Majority of farmers in the scheme are members of a group or cooperative, but major traders are local millers and brokers. This is attributed to liberalisation of agricultural markets opening up ways for private sector participation.

5.2 Demographic and Socio-Economic Factors amongst rice farmers in AIS

The average age of respondents was slightly above 50 years. The Constitution of Kenya defines a youth as a person above 15 years and below 35 years (GoK, 2010b); the study therefore finds very few youth engaging in rice farming, which could be attributed to the youth lacking the requisite resources especially land, to carry out rice farming. This finding is in line with Neven et al., (2009) claiming that there is no relationship between age and the marketing channel chosen by smallholder farmers. Majority of the farmers had experience of over 17 years, meaning they engaged in rice farming before liberalisation of agricultural markets. NIB register was renewed after 2002 to enable young farmers to take up the role of farming after the collapse of the scheme in 1998 and subsequent revival in 2002. Plot holders are custodians and administrators of the two ha allocation, but they have internal family sub-divisions. The plot holder makes the decisions of where, when, and how much loan to borrow, inputs purchase as well as where to sell the produce, giving the other family members limited decision making chances.

Formal chain farmers have a higher education level than informal chain farmers ($P=0.001$. From the discussion at FGD, farmers have given leadership responsibilities to the educated farmers especially at cooperative and group levels, and they provide direction regarding where to sell and to whom to sell paddy. This finding is in line with Rao & Qaim, (2011) who found out that those smallholder farmers who sell their produce to high-value markets have a higher education level than traditional market suppliers. Education therefore is posited to influence a household's understanding of market dynamics and therefore improve decisions on where to sell. If farmers receive training and access to formal education, they will be able to make informed choices regarding the sale of their paddy, especially by understanding economic opportunities of the different channels, quality parameters, and cost reduction avenues.

5.3 Characterization and economic opportunities of the marketing channels

As discussed by Sheperd (2014) that if a value chain approach is not adopted, especially in developing countries, the ‘unseen hand’ type of coordination (such as opportunistic behaviour, self-interest, short-term relationships, limited information sharing) will prevail in traditional spot markets. The findings in the study established that traders and brokers are the major chain coordinators with a strong influence on price, information flow, credit incentives as well as input supply. Seventy percent of the produce in the scheme goes towards the informal channel characterised by spot payments, limited negotiation by farmers, low-quality demand and low prices. Informal rice market channels include unofficial transactions between farmers, and farmers’ direct sales to consumers and intermediaries (brokers). MoA (2013) noted that Government controlled formal markets (such as farmers selling through the cooperatives to Government millers) have defined grades, quality standards and safety regulations. This was observed at the cooperative yard where farmers collect paddy, winnow to correct impurity percentage, dry, and weight in standard bags. A quality officer assists farmers to take moisture measurements and to confirm weights and record keeping before final delivery to Miller.

Farmers’ Gross margins were analysed to determine net prices paid by the channels, the gross margin shows that prices received were a reflection of the average gross margins for farmers selling to the different channels. Formal chain farmers received higher prices, at an average of Kshs. 42 per kg of paddy, compared to Kshs.35 for informal chain. This is attributed to supplying high-quality paddy, accessing post-harvest drying and storage facilities, and collectively marketing large volumes of paddy rice. In support of this, Qaim and Rao (2012) noted that the formal channels are known to be lucrative regarding paying a high value for products supplied

5.4 Constraints to formal market access in Ahero irrigation scheme

Following the definition of market access by Chamberlin, Jayne (2013), “market access constraints has multiple dimensions; institutional, socio-economic and technical”.

In this study, institutional roles were reflected by the participation of farmers in collective action, paddy payment durations, access to market information and distance to markets. It is acknowledged that market imperfections lock out small-scale farmers from formal markets hence not gaining economically (Hellin et al., 2009). In this study, more than 80% of the farmers in both chains belonged to a group or cooperative. There are over 30 SHG dealing with rice and one cooperative society in Ahero, implying that farmers and Government institutions in the area have realised the importance of collective action in rice production and marketing. However, it was found that the role of the SHGs was mainly to support production activities through credit, and seed acquisition. Few SHG sold members rice directly to government millers. In the case of AIS, the roles of SHG in the scheme should be widened, not only focusing on production, but also assist members dry and sell their rice in to formal channels and other high price markets. This can be done through NIB, given the fact that most of the groups were established and facilitated by Government.

Delayed payment is a key institutional aspect mentioned by farmers and this has made the majority of them to shy away from supplying rice to Government millers. The long delays by Government millers in remitting payments has become a matter of grave concern, in particular for the cooperative society. In the circumstances, the rice farmers and groups regard the Government millers as the market channel for disposal of surplus rice when no other trader is able to buy. Payments from the formal millers, if regular, could provide lump sum stable earnings to the farmers.

Corruption was rated second after delayed payments, and this was noted to be happening at both the cooperative level as well as at the Millers. Cooperative officials were reported to be paying farmers at a

lower rate than negotiated with millers and staff gaining personal economic advantage at the expense of members. Farmers have therefore lost trust with the cooperatives and groups. Trust is an important aspect of cooperation as it contributes to lower transaction costs, information availability and benefits from economies of scale. Farmers would want to operate in an environment where others will not act to exploit their vulnerability (Hansen et al., 2002). Corruption is increasingly linked to slow economic growth and high socioeconomic inequalities and poverty in Kenya. For the case of farmers, the fear of losing money through corrupt deals among millers and their officials have locked them out of the remunerative channels, hence economically disadvantaged.

Access to market information could have a significant effect on access to formal market. Market information mostly includes prices, markets, and quality aspects, type of product and alternative markets. (Jari and Fraser, 2009). In this research, it was found that majority of the farmers (80% and 53% in formal and informal chain respectively) were aware of market information and had interest in price as a driving factor in seeking information. Of interest in the study was that both farmer clusters relied on traders for information and they have built a long time trust with them, given that they get informal credit for inputs and other needs, which is repaid after harvest of rice. However, Mangisoni (2006) explained, smallholder farmers usually accept low prices for their crops when the intermediaries inform them that their product is of poor quality. Rice farmers were therefore found to accept prices offered by both chains mainly because they are unable to negotiate from a well-informed position, such as not knowing grading systems for rice, milling recovery of rice, as well as value added costs by millers. It is also important to highlight the role played by county Government and stakeholders regarding providing market information as very limited. According to farmers, they disagreed with the information-sharing platform in the County, which they ranked as very limited. FGD agreed that there was no information on rice market trends, grades and standards, and new markets provided by the government. Rice farmers could be able to sell their rice through the formal chain if they were facilitated to have access to appropriate market information.

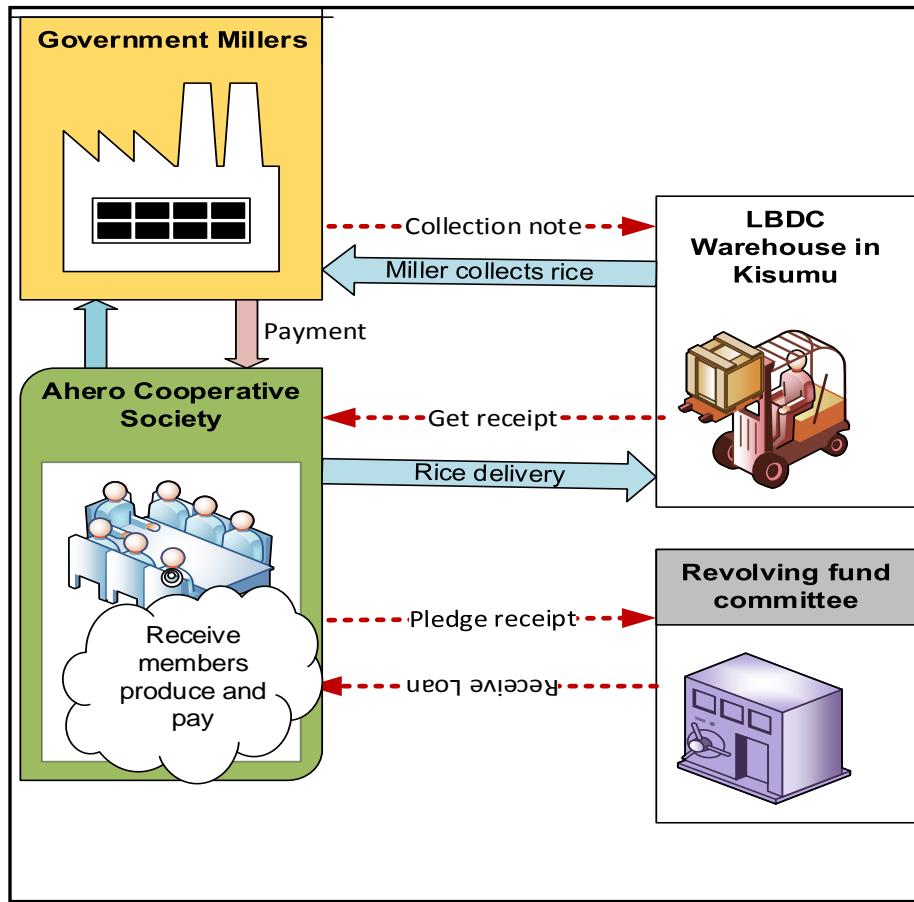
5.5 FGD Strategies to improve formal market access

i. Improving formal market access by smallholder farmers in Ahero through Warehouse Receipt System (WRS)

From the results on what farmer thought were the most suitable chain development strategies, it shows that majority (33% and 27% from formal and informal chains respectively) would want payment systems for rice delivered mainstreamed to promote prompt payments. According to KIT, (2006), with the use of warehouse receipt financing, also known as inventory credit, small farmers can gain an advantage on agricultural value chains through storage of produce and selling when prices are high. EAGC has certified LBDC stores in Kisumu as warehouses that can engage in receipt system, which within reach of farmers. Given the proximity to the scheme, and the suggestion by farmers to improve payment systems for their paddy, this strategy is found to be suitable for enhancing prompt payment to farmers.

Experience from different projects across Africa illustrates that warehouse receipts can make a difference to farmers income. By storing their products in a reliable warehouse until the buyers are ready to pay at the agreed price while using the product as loan collateral, farmers may access funds before they sell their produce (KIT, 2006). This will technically offer a solution to delayed payments by formal chain buyers. Warehouse receipts will also create price transparency. This empowers rice farmers to make informed sales decisions rather than waiting for “farm gate” buyers who often offer below-market prices.

Fig. 5.5a: Authors' Visual representation of proposed Warehouse receiving system in Ahero



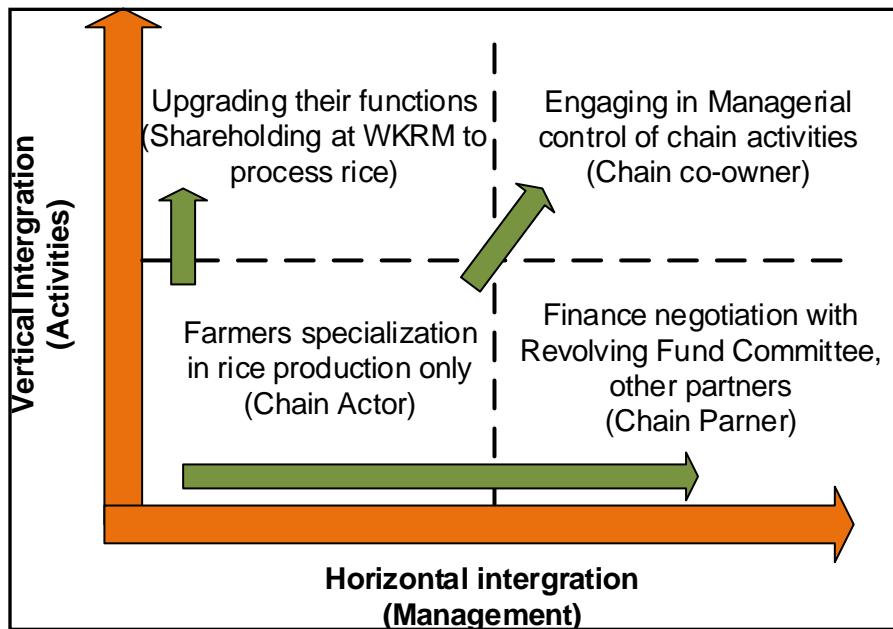
The County Government of Kisumu has promised to set aside funds to the tune of Kshs. Thirty million towards formation of a farmers' revolving fund kitty. The main function will be to buy most of the rice from farmers immediately after harvest and store in the LBDC warehouse, to which LBDC or any other buyer can access at agreed prices. Farmers' organisation will manage the funds, and once a farmer delivers his produce, he is paid for rice. This tripartite arrangement will work to streamlining payment among the farmers.

ii. Improving formal market access by smallholder farmers in Ahero through chain upgrading strategies

The second most appropriate strategy selected by farmers (20% and 13% from formal and informal chains respectively) would engage in other chain activities such as participating more in marketing and processing rice as a group. Market information access and organising farmers in to groups was the least suggested strategy, indeed farmers are well networked with availability of mobile phones and rice traders regularly visiting them. The Government through NIB have been involved in organising farmers into groups during the revival of the scheme in 2002; hence, farmers did not rank it as a major constraint.

As mentioned by the DGM, Operations (NIB), Farmers in Ahero through their cooperative society can revive their share portfolio in the WKRM, which they initially owned 45% of the company before the collapse of production activities in 1997. From the perspective of KIT (2006), three aspects of chain activity participation by small-scale rice farmers can be applied as illustrated;

Fig. 5.5 b; Chain upgrading strategy for Ahero Irrigation Scheme farmers.



Source: Adapted from KIT, 2006.

It can be deduced that vertical integration through functional upgrading is the preferred strategy by the interviewed farmers to improve access to formal channels of their rice business as illustrated in the figure above. As Shepered, (2014) confers that to avoid small-scale farmers being locked out of remunerative marketing channels or depending on other actors on embedded services such as input supply and credit provision they can vertically integrate their activities rather than only being involved in the production. Rice farmers are well networked socially, which is a valuable asset that can be used to integrate their activities vertically.

iii. Eradicating corruption in the rice value chain

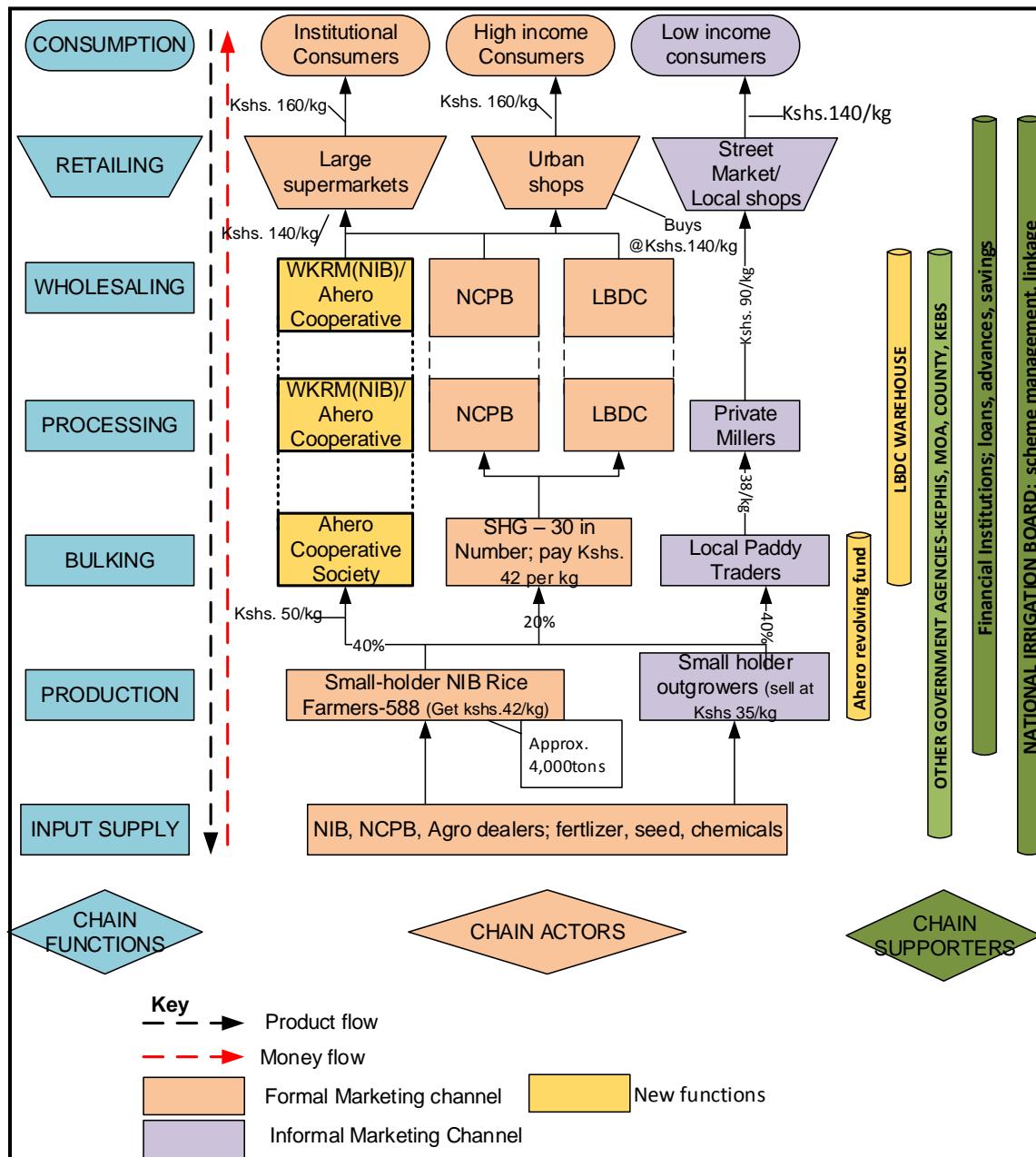
Governance and anti-corruption are now high priorities in the development agenda of Kenya (GoK. 2015). Stakeholders pointed out different forms of corruption during FGD, among them including farmer leaders negotiating for high prices and paying farmers less, bribery of quality inspection officials, and theft of paddy during distribution. These forms of corruption have manifested themselves across the rice subsector in Kisumu County, from producers in the scheme to millers. This was therefore identified to be one of the major deterrents of farmers supplying rice through the formal channel, and from the discussion, this has impacted negatively on the income and livelihoods of the farmers.

Value chain approach in analysing the rice subsector offers an operationally useful framework to help analyse corruption and target each level of the value chain; from production, collection, trading, milling and distribution. Despite the unavailability of specific data on corruption at the time of conducting this research, there is need to address the vice through collective responsibility of stakeholders. There is need to enhance transparency of operations at every level of the chain, because transparency has been known to be anchored on good governance. The proposed warehouse receipt system is expected to conduct transparent record keeping, from storage to release of paddy after payment. A multi-stakeholder oversight committee will need to be set up to oversee management and reporting of irregularities to relevant authorities. Farmers' records need regular and timely scrutiny from auditor's office to restore confidence of farmers in the society. Other raft of measures discussed to curb corruption included proper record keeping, issuance of pay slips to farmers during payments, operationalize mobile payments of

O&M payments to NIB, and formation of oversight committee for reporting purposes. This will ensure the success of both the warehouse system and functional upgrading process of the farmer organization.

5.6 Proposed rice value chain map

Fig. 5.6: Proposed rice value chain map



If proposed interventions are adopted, it is anticipated that 40% of the farmers in the scheme will supply through the cooperative. Price influence and increased transparency of financial management are key in winning the majority of farmers who are currently trading in the informal chain. New supporters include the revolving fund committee and LBDC warehouse.

CHAPTER 6: CONCLUSION AND APPLIED RECOMMENDATIONS

The objective of this thesis is to identify constraints to formal market access by small scale rice farmers in Ahero irrigation scheme, with the view of recommending possible strategies that can be used to assist them to access formal markets in the rice value. Adoption of a warehouse receipting system and upgrading the functions of the cooperative society will be effective marketing arrangement that will guarantee farmers prompt payments for delivered produce and financial transparency along the value chain. The rice value chain aspects and the dimensions of formal market access explored in the study will guide the recommendation of appropriate interventions for NIB and the rice farmers.

I. Conclusion

Based on the findings of the survey, key informant interviews and FGD with stakeholders, it is concluded that there are value chain constraints with regard to rice farmers accessing formal channels in Ahero irrigation scheme.

The rice value chain in Ahero offers two marketing channels to smallholder rice farmers, which are, however, utilised and accessed to different degrees. The channels differ significantly regarding volumes handled and functions assumed, with the majority of the farmers trading in the informal channel. The formal chain is characterised by typical government procurement system challenges about decision-making procedures and payment policies. This works to the advantage of local traders and brokers who can make decisions relating to price, quality and payment within a short time, even on the spot, hence they can buy from a majority of farmers.

The product characteristics (paddy) preferred in the formal channel should meet standards set by KEBS. Farmers however, feel the cost of post-harvest drying, winnowing, and standardising are high and they do not have immediate money for the activities. Some parameters, which are basic for formal millers to accept paddy, include moisture content of less than 14% and limited impurities at less than 5%. Rice from the smallholder farmers needs to improve in quality to enable access to formal markets.

Farmers supplying formal chain have economic opportunities and advantages with regard to gross profits and value shares along the rice value chain. However, delayed payments of paddy delivered to cooperative and groups negate the advantage of this channel. Farmers are unable to finance production activities without payment of previous harvests; hence, they rather sell on the spot or get loans from informal lenders to be repaid in kind after harvest. There is therefore need for NIB to focus on new business arrangements with financial institutions for prompt farmer payments.

Institutional constraints are a significant impediment to market access, especially for smallholder rice producers. Corruption along the value chain has taken root and farmers are shying away from government related channels due to fear of losing money or paddy. There price setting is not transparent, farmers sometimes lose paddy in stores leading to high costs, and economic loses. Access to market information is still a key challenge in the scheme. Of particular interest is that farmers and leaders are not involved in price building i.e. they are not aware of what informs the traders and millers to set a specific price. Hence, they dispose their rice at a price offered by buyers through limited information obtained from the vicinity and at the closest market or traders. NIB and the County Government of Kisumu can play key role in ensuring farmers access reliable and accurate information particularly at harvest time. It is also observed that NIB plays most of the functions in the chain concerning managing production activities, service provision, and as an actor in processing function through the WKRM Ltd. Most of the stakeholders seemed to have shied away from the rice value chain due to limited inclusion in decision-making. Value chains

only thrive if all actors consider themselves to be part of an inter-linked system and work together on new business arrangements and solutions for value chain challenges. Therefore, NIB in pursuit of its mandate can strengthen coordination among value chain actors to increase reliability and trust building as a basis for collaboration.

It is also concluded that Socio-economic aspects of farmers and traders also constrain them from accessing formal channels. Farmers are limited in entrepreneurial skills, which limits their ability to make informed decisions about marketing channels. Despite the excellent experience of farmers in rice production, their internal management system within families also affect their decisions. The plot holders having on average two ha are the registered administrators of the plots, but they have done family subdivisions on their own, but the decision of where to sell, and when lies with the administrator. NIB'S policy about division of land and registration of farmers is something that needs to be reformed to allow young farmers to be involved in decision-making.

A key need of the rice-farming households in Ahero is the access to financial capital. Majority of the farmers are dependent on informal credits with high repayment costs majorly in kind. Credit lending in the scheme is often associated with paddy tied credit-output relationships, as debt is paid back in kind. Stakeholders interviewed characterised these pre-arrangements as unfavourable to the farmer, because of their limited options to choose a buyer who offers a better price. They want to become independent of these financial ties. Lack of financial records, collateral, low trust, and long paper procedures limits them from accessing loans in the formal banking sector.

Farmers are receptive of marketing arrangements that are built on trust and transparency. Warehouse receipt system as discussed in 5.5 and upgrading of the cooperative society functions are perceived to solve the long outstanding challenge of delayed payments and corruption.

II. Applied recommendations

To improve access to formal market in accordance with this study's objective, rice farmers need to be empowered to improve their marketing practices. Therefore, the ability of these farmers to freely choose from the existing marketing opportunities and to freely decide the time of sale needs to be increased by reducing or eliminating barriers to entry. In a long-term viewpoint, this improves bargaining power and ultimately leads to higher prices and thus increased incomes.

Potential interventions that target the formal market access of smallholder rice farmers therefore have to address the market-related constraints. Five recommended areas of intervention are:

- ***Facilitating prompt payments through warehouse receipt system:*** the author seeks to coordinate a new business arrangement in the development and operationalisation of the warehouse receipt system. By utilising the already available structures and financial pledges by the county Government, NIB's position in the value chain will be to bring the cooperative officials, LBDC, Revolving fund and County government in to a business arrangement whereby all parties agree for mutual benefit. The author, through his position at NIB as the manager of the scheme will present the business arrangement to stakeholders before the onset of cropping calendar 2018 (May 2018). Once the arrangement is adopted by the parties, a pilot phase will be implemented by December of the same year (after harvest), targeting five percent of the scheme paddy. The cooperative will be able to access funds from revolving fund and pay farmers on the spot, then bulk the paddy at LBDC warehouse awaiting sale at an appropriate time.

- ***Establishment of “paddy commercialisation” loan at Ahero irrigation scheme;*** NIB through the scheme manager will seek to create loan facility through the revolving fund committee formed by farmers. The county government of Kisumu has pledged to fund the committee, hence the author through his position as schemes manager will convene stakeholders meeting before harvest season of 2019, to put modalities and limits for society and groups to borrow. This will follow the piloting phase of the warehouse receipt system, and if all aspects and challenges are addressed in time. Necessary by-laws will be put in place to guide administration of the fund. This will allow farmers access funds with minimal collateral such as paddy delivered or expected to be harvested.
- ***Facilitate functional upgrading of the cooperative society:*** Ahero cooperative society can upgrade their functions from just collection, to processing through NIB subsidiary company WKRM. The scheme's manager, who is also the mill's manager for WKRM will develop a board paper to the directors for the incorporation of the society in the shareholding of the company. Before liberalisation, the society was a shareholder in the company, but due to the collapse of production activities, the society went under, hence the need to re-introduce their shareholding, not only to supply rice as before, but also to process and distribute branded white rice. The board of directors at NIB are expected to facilitate the manager to make necessary business arrangements between mid-2018 to mid-2019.
- ***Facilitate Good-practice learning platforms:*** to curb corruption along the value chain and build farmer trust in the government channel, farmer leaders and stakeholders need exchange platforms that strengthen good governance learning. Some cooperatives and value chains such as tea in Kenya are very successful and well managed, providing an array of benefits to members. Their management experiences are invaluable and should be used to showcase good governance practices. Thus, NIB through the scheme manager Ahero in collaboration with farmer organisations will design activities exchange program as a learning incentive to stakeholders in neighbouring tea-growing County of Nandi. This is scheduled to happen within the production window of June to November 2018, before farmers in Ahero engage in harvesting and marketing. This will also improve intra-value chain coordination and collaboration among actors, supporters and influencers resulting in higher resilience to market access constraints, efficiency gains, and functional upgrading developments, also benefitting smallholder rice farmers.

Taking into account one of NIB's mandate of “promoting marketing of produce from irrigation schemes”, feasible and promising recommendations have been made based on identified market access intervention areas. Through these interventions, farmers would be expected to make informed decisions regarding the marketing of their rice and in turn improve their economic and social well-being.

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ANNEXES**A. Semi structured questionnaire****INTERVIEW QUESTIONNAIRE**

Sub-County	Questionnaire No.	Date of Fulfilment	Name of Interviewer
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Section A: Farmer Demographics	
1. Tenant No	5. Education Level:
2. Age.....	a. Primary <input type="checkbox"/>
3. Gender : Male <input type="checkbox"/> Female <input type="checkbox"/>	b. Secondary <input type="checkbox"/>
4. Marital status: a. Single <input type="checkbox"/> b. Married <input type="checkbox"/> c. Widow/widower <input type="checkbox"/>	c. College <input type="checkbox"/>
	d. University <input type="checkbox"/>
	e. No education <input type="checkbox"/>

Section B: Socio-Economic aspects	
6. What is the total number of family members? A. Below18 <input type="checkbox"/> b. above 18 <input type="checkbox"/>	
7. Are there household members working or doing business off farm? Yes <input type="checkbox"/> No <input type="checkbox"/>	
8. If yes, specify whom: a. Household head (man) <input type="checkbox"/> b. Wife <input type="checkbox"/> c. Son <input type="checkbox"/> d. Daughter <input type="checkbox"/>	
9. For how many years have you been a rice farmer?.....	
10. Apart from rice, what are your other on-farm sources of income? (Specify the items and income obtained from each per year)* To assist farmer calculate*	
a. Transport business	
b. Livestock	
c. Laborer in other farms	
d. Food crops	
e. 5. Other (Specify)	

Section C: Production and Marketing aspects

<p>11. What is your total area of land under rice production?</p> <p>a. less than 1 acre <input type="checkbox"/> b. 1-2 acres <input type="checkbox"/> c. 2-3 acres <input type="checkbox"/> d. 3-4 acres <input type="checkbox"/> e. more than 4 acres <input type="checkbox"/></p> <p>12. From where do you buy your inputs?.....</p> <p>13. Average output/acre/season?.....</p> <p>14. What costs do you incur per year? Kshs.....</p>	<p>15. Specific costs per acre (Calculate with respondent)</p> <p>Inputs (seed, agro)..... Irrigation (NIB) Rotovation charges..... Planting costs..... Weeding costs..... Harvesting charges..... Drying & winnowing Storage & marketing..... Total/acre -(Kshs)</p>																						
<p>16. What revenue do you get from your rice farming on seasonal basis? Kshs.....(calculate gross margin value with respondent)</p>																							
<p>17. Who is your main buyer of rice?</p> <p>Brokers on farm <input type="checkbox"/> Local trader with mill <input type="checkbox"/> Government Miller <input type="checkbox"/> Local consumers <input type="checkbox"/> Cooperative society <input type="checkbox"/></p>																							
<p>18. What is your reason for your choice of buyer above?</p> <p>Provides transport <input type="checkbox"/> negotiated price <input type="checkbox"/> offers better price <input type="checkbox"/> buys without quality conditions <input type="checkbox"/> immediate payment <input type="checkbox"/> I sell to any buyer that is available <input type="checkbox"/></p>																							
<p>19. What is the buying price/Kg?.....</p>																							
<p>20. Are you satisfied with the price? Yes <input type="checkbox"/> No <input type="checkbox"/></p>																							
<p>21. What services/incentives do you receive from your buyer?</p> <p>Training <input type="checkbox"/> Market information <input type="checkbox"/> Credit <input type="checkbox"/> Inputs <input type="checkbox"/> Exchange trips <input type="checkbox"/> None <input type="checkbox"/></p> <p>23. Where does the sale take place?</p> <p>On-farm <input type="checkbox"/> Roadside <input type="checkbox"/> collection center <input type="checkbox"/> cooperative <input type="checkbox"/> Local town <input type="checkbox"/> Miller <input type="checkbox"/> other <input type="checkbox"/></p>	<p>22. What do you think is main constraint to selling rice in the formal chain? Constraint ranks: 1-7: with 1 being the highest constraint)</p> <table border="1" data-bbox="708 1184 1400 1666"> <thead> <tr> <th>Constraint</th> <th>Rank</th> </tr> </thead> <tbody> <tr><td>High marketing cost</td><td></td></tr> <tr><td>High quality demand</td><td></td></tr> <tr><td>Lack of market information</td><td></td></tr> <tr><td>Low production volumes (Quantity)</td><td></td></tr> <tr><td>Unreliable market</td><td></td></tr> <tr><td>Delayed Payments</td><td></td></tr> <tr><td>Corruption</td><td></td></tr> <tr><td>Lack of trust</td><td></td></tr> <tr><td>Inconsistent supply</td><td></td></tr> <tr><td>Distance to markets</td><td></td></tr> </tbody> </table>	Constraint	Rank	High marketing cost		High quality demand		Lack of market information		Low production volumes (Quantity)		Unreliable market		Delayed Payments		Corruption		Lack of trust		Inconsistent supply		Distance to markets	
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Inconsistent supply																							
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24. If sale is not on farm, how do you transport?

Self on foot Bicycle Motorbike (own) Hired Motorbike Car Truck

25. How much did you pay for the transport in the last season?Kshs. /bag of 80 Kg

26. When are you paid for rice sold?

a. On the spot b. 1-7 days c. after 7 days

27. Who sets the selling price of your rice?

a. Farmer (self) b. Buyer c. Farmer group d. Cooperative

28. How do you usually communicate with your buyer?

Face to face on farm Mobile phone I go to buyer
Through group/cooperative Through intermediaries Others

Section D: Institutional Factors

29. Are you a member of a rice self-help group?

Never been member Member Left membership

30. If member, what services do you get?

Marketing Training Information Exchange trips
Bulk input sourcing Other

31. What area does the farmer group participate?

Production Marketing Both Other

32. If left, what was the reason for leaving group:

Financial Mismanagement Corruption High cost Other (specify)

33. Are you aware of market information? No Yes

34. Are you interested in market information? No Yes

35. What type of information are you interested?

price quality and standards financial services new markets
Other (specify)

36. If you have access to market information, who provides it?

Agriculture extension staff Local traders Government millers
Media other farmers others

37 Rice sub sector in the county have strong Information sharing and flow among rice chain actors!

Strongly disagree Disagree Agree strongly agree

38. What is the distance to the nearest market?

0-5km 5-10km 10-15km 5-20km more than 20km

39. What is the average transport cost to your market?

Section E: Perception on formal marketing

40. Do you have experience of selling rice through the formal channel?

YES NO

41. How was your experience of selling through the formal chain?

Positive Negative Not know

<p>42. What factors do you see as a constraint to farmers accessing formal markets?</p> <table border="0"> <tr><td>Small volume of rice</td><td><input type="checkbox"/></td></tr> <tr><td>Distance to buyers</td><td><input type="checkbox"/></td></tr> <tr><td>Quality requirements</td><td><input type="checkbox"/></td></tr> <tr><td>Inconsistent supply</td><td><input type="checkbox"/></td></tr> <tr><td>Lack of trust with buyers</td><td><input type="checkbox"/></td></tr> <tr><td>Delayed payments</td><td><input type="checkbox"/></td></tr> <tr><td>Corruption</td><td><input type="checkbox"/></td></tr> <tr><td>Lack of information</td><td><input type="checkbox"/></td></tr> <tr><td>Do not know</td><td><input type="checkbox"/></td></tr> </table>	Small volume of rice	<input type="checkbox"/>	Distance to buyers	<input type="checkbox"/>	Quality requirements	<input type="checkbox"/>	Inconsistent supply	<input type="checkbox"/>	Lack of trust with buyers	<input type="checkbox"/>	Delayed payments	<input type="checkbox"/>	Corruption	<input type="checkbox"/>	Lack of information	<input type="checkbox"/>	Do not know	<input type="checkbox"/>	<p>43. What do you think the Government can do to help farmers access formal markets?</p> <ul style="list-style-type: none"> a) Improve infrastructure like roads in the area b) Invest in drying and storage facilities in the scheme c) Avail market information to farmers d) Promote farmers to engage in other activities such as value addition e) Organize farmers into groups f) Offer training and capacity building to farmers (agribusiness) g) Fight corruption in farmer organizations and buying bodies h) Provide financial incentives for production i) Streamline payment systems to be faster j) Other
Small volume of rice	<input type="checkbox"/>																		
Distance to buyers	<input type="checkbox"/>																		
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Corruption	<input type="checkbox"/>																		
Lack of information	<input type="checkbox"/>																		
Do not know	<input type="checkbox"/>																		

"Thank you for your participation in filling this questionnaire!"

B. Checklist for interviews

Checklist for Local Rice Trader (Jay Jay Traders)

1. Obtain information on informal rice trade; source of rice (cooperative, farmers)
2. Payment modalities to farmers (time)
3. How they co-ordinate in terms of volumes and quality; any standards
4. Transaction costs, selling price, amount sold, quality issues, problems they face in marketing and sourcing rice from farmers
5. Opportunities for forming an association as traders and their perceptions in participating in the formal chain through purchase of rice from farmer cooperative
6. Perception on Threats to informal marketing from formal marketing, strengths, weaknesses.
7. Information flows: how they reach farmers, communicate.

Checklist for interviews with NCPB Manager

- 1) Introduction of the company: Mission, objectives, and roles in the rice value chain
- 2) Mandate of the company/responsibilities
- 3) Sources of processing material ;rice (farmers, cooperative or elsewhere)
- 4) Quantity of rice purchased annually
- 5) Buying price and selling price rice.
- 6) Duration of paying suppliers after they deliver rice.
- 7) Product requirements preferred by consumers and what the company looks for before buying from supplier. Grades and standards applicable.
- 8) Supplier's ability to meet the product requirements.
- 9) Information flow between the company, suppliers and customers.
- 10) Incentives to suppliers.
- 11) Opportunities for smallholder rice farmers to supply them. Areas that the farmer needs support.
- 12) SWOT: formal chain vs informal

Checklist for interviews with Ahero Cooperative Society chairperson

1. Introduction of society; mission, and roles/services offered
2. Membership criteria, and number of members (including costs for membership)
3. Volume of rice delivered by members,
4. Selling price and marketing charges.
5. Grades and standards demanded by formal chain millers and ability of members to meet the requirements.
6. Constraints in marketing rice in the area; formal vs informal trade
7. How members get marketing information
8. Opportunities for smallholder farmers in the informal chain to access formal chain.
9. Threats to society , Strengths, Weaknesses
10. Financial management , trust, corruption
11. Availability of storage facilities, road infrastructure, communication.

Checklist for interviews with County Executive member, Ministry of Agriculture; Kisumu County.

1. Introduce the role of the department in Kisumu county, and its relation to Ahero Irrigation scheme
2. What policies/market institutions are in place to develop the rice sub- sector in the county?
3. Opinion on challenges faced by small scale rice farmers in accessing formal markets
4. Opinion on strategies that can be employed to improve marketing of rice in the region (specifically small scale farmers)
5. PESTEL: farmers' inclusiveness in decision making at county; for instance fund allocation to scheme projects by the county Government. Do farmers have a say?
6. Information flow to farmers

7. Capacity building opportunities for farmers, stakeholder meetings.

Checklist for interviews with NIB Manager

1. Introduction of the organization, Mission, and objectives, specific mandate
2. Roles in the rice sub-sector within the study area
3. Marketing policies and strategies in place
4. Farmer charges, and service rendered for the cost
5. What the organization feels it can be done to enable farmers sell rice through the formal chain
6. Perception on farmers organizations; management, and marketing
7. Financial support to farmers, incentives,
8. Irrigation scheme infrastructure; roads, irrigation, communication, storage facilities status
9. Production support/inputs and their costs
10. Seasonality of rice production: use cropping calendar

Focused group discussions with farmers

1. Obtain information on rice stakeholders, marketing situation: use chain map as tool.
2. Marketing channels and characteristics (chain map)
3. Where and how they co-ordinate in terms of volumes, quality, the cost and selling price, amount sold, and quality issues.
4. Problems they face in marketing, opportunities/benefits for member of a rice growing self-help group or cooperative. (use causal diagram to guide and extract information)
5. Information flows; How farmers access information, type, and time
6. Capacity building programs; by who? How? when?
7. Infrastructure availability and status; roads, storage?
8. Their perceptions in participating in the formal marketing channel
9. Management aspects of the farmer organizations
10. Their view on possible strategies they wish to see promoted or done by Government and stakeholders in rice value chain.

C. Descriptive statistics tests

- a) Difference in education level between formal and informal chain respondents. (Mann-Whitney Test)

Test Statistics ^a	
	Education Level
Mann-Whitney U	46.000
Wilcoxon W	166.000
Z	-2.941
Asymp. Sig. (2-tailed)	.003
Exact Sig. [2*(1-tailed Sig.)]	.005 ^b

a. Grouping Variable: Group

There is a difference in education level between formal and informal chain respondents.
(p<0.005)

- b) Test for difference in average output/acre/season in formal and informal respondents.
Mann-Whitney Test

Test Statistics ^a	
	Average output/acre/season
Mann-Whitney U	110.500
Wilcoxon W	230.500
Z	-.085
Asymp. Sig. (2-tailed)	.933
Exact Sig. [2*(1-tailed Sig.)]	.935 ^b

a. Grouping Variable: Group

There is no difference in average output/acre per season among the formal and informal respondents (p>0.005)

c) Test for difference in Gross margins between Formal and informal respondents

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Gross Margin variances assumed	.488	.490	3.808	28	.001	12818.66667	3366.54582	5922.61017	19714.72316
Equal variances not assumed			3.808	27.017	.001	12818.66667	3366.54582	5911.28490	19726.04843

There is a difference in gross margins between formal and informal chain respondents. (p<0.005)

d) Interview transcripts

1. Key informant interview with LBDC

Interview Transcript with Marketing Manager – Centrine Changalwa and General Manager, Mr Lubanga
17/7/2017



Pic 1: interview with Centrine (Marketing manager). Pic 2: LBDC General Manager showing warehouse certificate to researcher.

Introduction and roles

The Marketing manager of said LBDC is a subsidiary company of Lake Basin Development Authority (Government agency with mandate of overseeing development in the Lake Victoria basin of Kenya). LBDC serves as an income generating company for LBDA. It has established milling complex for rice with a throughput capacity of 25tons per hour cleaning and drying, and 3.5tons/hour milling (can mill up to 24,000tons/annum). The company diversified to rice seed production, animal feed manufacturing, and clean water bottling. Their main objective is to tap into the huge rice-subsector in the region with the aim of enhancing food security and improving livelihoods through better rice incomes.

Source of paddy rice and quantities (sourcing channels)

Centrine said public irrigation schemes in the Lake Victoria basin (Ahero, West Kano and Bunyala irrigation schemes) are main sources of rice. Farmer cooperatives in the schemes supply the company. Ahero only supplied 6000bags (480tons last season). Out grower irrigation schemes like Chika, southwest Kano and Nokiso. Farmer organizations. Annual target is 24,000tons, but the compare procured only 4,800 tons (20% of the target). Reason is stiff competition from brokers who buy at farm immediately farmers harvest. Procurement declining annually for the last three years.

Buying and selling prices (Costs and revenues)

It was established that the Current price offered to farmers is Kshs. 42.00 per kg of paddy rice that meet quality requirements upon inspection. Upon receipt, we mill and sell depending on demand. Currently 1 kg of milled rice sells at Kshs. 140.00.

- Milling recovery %:

s/no	Recovery output description	Recovery Percentage	Price per Kg
1	Grade 1 milled white rice	55%	140.00
2	Broken rice	5%	50.00
3	Chicken feed	1%	25.00
4	Fine bran meal	10%	15.00
	Total recovery	71%	

Meaning for every 1 kg of paddy rice milled, the company recovers approximately 700grams

Payment modalities (Institutional constraints)

The General Manager said the company policy is to pay within 30 days. However, sometimes delay due to procurement procedures and it happens mostly when we have to vary prices hence need approvals. As at

now, farmers were paid within 14days of delivery. Farmers' cooperative officials collect cheques and sometimes money is transferred directly to their account. It should tally with Kilograms delivered to factory.

Paddy rice requirements (Quality standards)

- Moisture content; 13-14%
- Impurities not exceeding 2%
- Premature content not exceeding 4%
- Also check colour (golden), chalkiness and internal cracks (use crushing moisture meter).
- Farmers find it very difficult to meet quality standards and most of them prefer selling to brokers who buy at high moisture content with many impurities.

Information flow

The manager reiterated that their company agronomist and marketing manager hold meetings with farmer leaders at start of production season to share expected volumes to be purchased, quality requirements, expected price range as well as any other incentive the company has. Payment durations and expected paddy rice delivery dates. Advertisement of our products through print media, TV and agricultural shows

Incentives to paddy rice farmers

- Training; covers agribusiness, financial management, farmer organizational management.
- Transport at subsidized price (now charging Kshs. 1.00/kg of rice delivered)
- Free paddy rice quality inspection and advice to farmers
- Available storage facilities for rice farmers who may want to store for longer duration.

Opportunities for farmers supplying through formal chain

- Availability of certified warehouse; LBDC got certification recently and it is an opportunity for farmers to deliver all their produce and store awaiting better prices. Through warehouse receipting system, they can access advances or credit from financial institutions.
- Contract farming; LBDC has been trying contractual agreements, and it is still an opportunity for farmers to be guaranteed market.
- Government goodwill to support farmers through LBDC, hence offer higher price than brokers do.
- Credit; farmers can get seed and fertilizer on credit based on contractual agreement to supply LBDC

SWOT

- See combined SWOT analysis

Constraints to farmers access to LBDC Market

- Inconsistent supply; farmers production cycle short (supply from November to January).
- Low quality paddy; manual harvesting especially during rainy season affect quality
- Lack of trust between farmers and company
- Erratic price changes
- Need for immediate payments by farmers
- Need for financial assistance to farmers to avoid them taking-harvesting advance from brokers, which is expensive to repay (100kg bag repays 2,000 advance; real market value of 100kg bag is 4200.

2: Key informant interview with County Government of Kisumu

Interview Transcript with Agriculture Minister (County Executive) – Hon P. Obade



Pic 1: Interview with Hon. Obade Pic 2: With Kisumu county Governor; visiting NIB rice mills.

Introduction and roles

The CEC said that the State department of Agriculture devolved from the National Government to the County Government under the new constitution of Kenya. The roles are to ensure food security among Kenyans through promotion of production and marketing of produce. Also provides the policy framework and its implementation. Give extension services to farmers in Ahero irrigation scheme (rice officer posted to the scheme) and working closely with NIB

Polices and marketing bodies to promote rice sub-sector in county

The County CEC said the new Agricultural Sector Development Strategy 2010-2020 (ASDS) is aimed at providing guidance to sector players to overcome challenges in production and marketing. It also aims at generating incomes as well as employment to rural poor. It is also expected to position the agricultural sector as a key driver in achieving the 10 per cent annual economic growth rate envisaged under the Vision 2030. Under the ASDS 2010-2020, agricultural ministry to ensure that farmers, producers, processors and marketers of agricultural produce are up to date with new technologies. Expected to prudently manage factors of production such as land, water, inputs, and financial resources to ensure low production costs. There is also the establishment of National Rice Development Strategy (NRDS); Objective is to double rice production by 2018; hence, activities undertaken by ministry under this include: Expansion of irrigable land, reduction of field and storage loses; improve farmers access to credit and inputs, high quality seed, extension and capacity building of rice farmers. Establishment of NCPB to buy grains for strategic reserve, as well as stabilize prices under ministry of agriculture. Currently buying rice from Ahero irrigation scheme.

Opinion on challenges faced by farmers in accessing formal markets

The county CEC noted that marketing of rice and its products is critical to increasing agricultural productivity in schemes as well as commercialization of enterprises. Generally, marketing chains for rice in the region are long, not transparent and consist of many players making them inefficient and unresponsive to producer needs. Farmers complain of delayed payments to my office sometimes. High quality requirements, lack information on current market prices as well as new opportunities to sell. Land tenure system; does not allow them access credit facilities, Poor storage and handling facilities. Poor infrastructure such as roads connecting them to nearby markets

Strategies/opportunities for farmers to access formal markets

Enabling environment: Ministry spearheaded formation of rice stakeholder's forum in the county to address challenges of rice-subsector, mostly production and marketing. Policies on rice sub-sector improvement in place through NRDS. Other opportunities mentioned by CEC include;

- Contract farming
- Mechanization; ministry has procured tractors and implements for rice farmers in Ahero, hence expected to boost production and quality improvement.

- Strengthening of cooperative movement; county has established farmers revolving fund to be accessed by farmers who are members of a cooperative
- New and expanding markets: the county is uniquely placed to take advantage of expanding domestic, regional and international markets
- Potential for increasing production; vast area available for production of rice, hence meeting required market volumes
- Value addition; through privatization of the rice sub-sector, farmers can invest in mills and add value to their produce.

PESTEL

- See combined PESTEL analysis

Constraints

- Low budgetary allocation; hence limiting extension capacity
- Low absorption of modern technologies by farmers; ineffective extension
- High production cost among farmers
- Limited capital and access to credit by farmers
- Lack of coherent land policy to guide management of land resources
- Inadequate infrastructure
- Inadequate storage and processing facilities
- Inadequate output markets and market infrastructure
- The local marketing information system has recently been established but has not been well utilized by farmers

3: Key informant interview with Ahero Rice Cooperative Society

Interview Transcript with cooperative chairman – MR. Jacob Ongere

27/7/2017

Pic 1: Interview with cooperative chairman Pic 2: Researcher perusing cooperative documents with clerk



Introduction and roles

An interview with the society chairperson established that the Ahero cooperative Society is registered under ministry of cooperatives development with the main objective of serving rice farmers in Ahero Irrigation Scheme. It is a Membership organization; currently with 163 members. (See separate list provided by society). They assist farmers in production financing; manages a revolving fund whereby farmers access loans and society deducts upon sale of rice. Net value is remitted to farmers. Main interest is collective marketing of rice in Ahero. Cooperative is a minority shareholder at WKRM (45% shares). Currently dormant shareholder.

Production and Marketing of rice/channels

Membership to society comprise of Irrigation scheme farmers who are plot holders and registered with National Irrigation Board. (Copy of society by-laws provided by society officials). They are rice farmers. Members acquire production inputs through society; and as per current season farmers had already received the following;

- ❖ Rice seeds @ Kshs. 88.00 per kg (2kshs. Lower than market rate)
- ❖ Rotavation service @ Kshs. 2800.00 per acre
- ❖ 2 bags of SA Fertilizer @ Kshs. 1400 per bag. (Subsidy through NCPB).
- ❖ 1liter of pesticide @ Kshs. 1500
- ❖ 1Kg of Fungicide @ Kshs. 1800

NIB handed over the drying yard for rice at the scheme after liberalization. In dilapidated situation now; but farmers use collectively to dry and aggregate their produce. After members harvest rice, they deliver centrally to the cooperative. Currently only 102 members have supplied their rice to the cooperative.

Selling prices and charges

Cooperative sells to NCPB, LBDC, and WKRM. Depending on first come first served basis. Current price is Kshs. 42.00. Society charges interest to members on inputs and marketing. Costs are;

- ❖ Marketing charges @Kshs.50.00 per bag
- ❖ Transport of paddy from fields @ Kshs. 20 per bag
- ❖ Interest on inputs at 3% (for operations of the society)

Grades and standards

- Buyers demands on quality is very high; MC 14%, clean paddy, minimal impurities.
- Millers send quality inspection officer to the farmer's yard to inspect quality before delivery and payment.
- Majority of farmers cannot bring rice to cooperative because of high quality demand. They prefer to sell on the farm to brokers who do not require quality paddy.

Constraints

- Unpredictable prices; seasonal variations of prices(low price of Kshs 32 at harvest and as high as 45 when production is off season)
- Volumes: farmers delivering low volumes than the agreement with society. Majorly attributed to brokers who buy at farm gate
- Poor quality: farmers deliver paddy with high impurities leading to rejection; at times society incurs loses because it meets the cost of drying and winnowing again.
- Weak market coordination; stakeholders in rice value chain not working together; hence farmers left at mercy of brokers
- Weak farmer institutions; the management committee lacked proper accounting documents as well as financial management skills; hence loss of trust with farmers.
- High production costs; society attribute low profitability to high production costs; e.g. land preparation

Information

Majorly from traders and NIB officers and Buyers do meetings with cooperative at harvest season to agree on prices. No formal communication channels. Issues they discuss include; quality, prices, payment modalities and support services. Mobile phones and letters are major avenues of communication.

Opportunities for informal chain farmers to access formal chain

- Farmers can join cooperative as members (low registration fee of Kshs. 250)
- Higher price for paddy at Kshs.42
- Subsidized transport from farms (costs above)
- Cheap inputs from bulk purchases (see breakdown above)
- Farmers can make use of drying and storage facilities at NIB Yard
- Access to cheap loans for production activities

SWOT (Combined swot analysis)

Physical infrastructure

NIB handed over stores, and drying yard to Society after 2002. Now dilapidated (Pics above). Only one yard and one store available. Limited capacity to handle , Roads are impassable hence high transport costs arising from use of hired motorbikes.

4: Key informant interview with National Irrigation Board

Interview Transcript with Deputy General Manager (Operations

27/7/2017

Introduction

DGM Said NIB is a government agency established in 1966 by the Kenyan government to accelerate expansion of irrigated area, reduce food insecurity and improve livelihood across the country. The main Mandate of NIB is to develop, control and improve national irrigation schemes in Kenya. It operates and maintains all public schemes. In relation to marketing, one of the core mandates is to promote marketing and processing of produce in the schemes. Established two milling plants; Mwea and Western Kenya to buy rice from irrigation scheme farmers.

Specific roles in Ahero irrigation scheme

- Operation and maintenance of the scheme (water abstraction, pump maintenance, canals maintenance, roads maintenance, water distribution)
- Linking rice farmers to markets through other Government bodies e.g. NCPB, LBDC
- Buy rice from farmers through Western Kenya Rice Mills (WKRM)
- Extension services
- Land dispute resolution
- Seed production and distribution

Marketing strategies in place

NIB devolved production and marketing function to farmer organizations. Cooperative and rice self-help groups. 30 groups in Ahero. 1 cooperative. Linking farmers to markets (NCPB, LBDC, County Government of Kisumu). Provision of stores (need repairs and rehabilitation). Contractual agreements with farmers to supply. Not always honoured. Producing best varieties (Basmati and sindano), preferred most by customers.

Charges/costs to farmer

- Operation and maintenance fee per rice season Kshs. 3,100
- Transport charges for paddy rice from fields to stores at Kshs. 25 per 80kg bag.
- Seed costs Kshs. 90 per kg

NIB Opinion on having all farmers sell through formal chain

- Upgrading cooperative roles; if financially empowered cooperative can buy 60% of the rice mill shares and farmers can deliver produce for prompt payments.
- Prudent and transparent management of farmer organizations to enable farmers have trust in them.
- Collaboration of stakeholders to build modern drying and storage facilities for farmers
- Land reforms; tenure system change to allow farmer access credit

Status of scheme infrastructure and machinery (Technical aspects)

Drying and storage facilities: dilapidated; need massive rehabilitation. Store with capacity of 60,000 bags (not enough for projected scheme harvests of 150,000 bags).



Roads: all weather roads available but majority not passable. Farmers use motorbikes to access collection centres, higher charges.



ICT: Farmers can pay through Mpesa paybills, but currently no information systems being used by farmers
Manual rice harvesting; quality compromised. County Government bought land preparation equipment.

Seasonality of production

- Calendar of production provided.
- Planting starts June and harvesting by November to January. 4 months cycle. However, cropping is staggered due to water availability and distribution challenge as well as pump breakdowns.

Challenges/constraints

- Inadequate finances to invest in irrigation development;
- Unpredictable weather patterns and effects of climate change;
- Low adaptation of modern irrigation technology;
- Limited, fragmented research and development;
- Outdated national plan and policy, legal and institutional frameworks;
- Aging infrastructure;
- Inadequate human capital amidst inadequate skills and competencies; e.g value chain experts
- Loss of cropland to alternative land use.

SWOT and PESTEL- Formal vs Informal chain; See combined analysis.

5: Key informant interview with Local rice trader

Interview Transcript with Jay Jay Peter (Owner-Jay Jay traders Limited)
21/7/2017



Introduction:

Jay Jay said he has been a rice trader in Ahero town from 2006, when the scheme was revived after the collapse. He has small mill with capacity of 40tons/hr. Proximity to Ahero scheme is of advantage to him, low transport costs and easy to visit farmers' fields. Buys rice at the onset of harvesting in Ahero irrigation scheme. He collects directly from the farms using his pick-up truck and sometimes hired motorbikes when it is raining, and pays on the spot. Sometimes advances farmers loans for harvesting based on trust, and recovers when paying farmer for final delivery. Currently he buys at Kshs 35.00 . No restriction on moisture content. Bags are also not standardized to 80kg, some go to 100kg. Claims that is how he recovers lost cost in moisture. Mills and sell to local shops and women who sell on the roadsides. Price is Kshs. 110.00 No packaging; packed in 50kgs sacks, women will sell in 2kg or 1 kg tins. Local shops pack in different sizes. Recovery percentage; 60%; mill has no color sorter, and destoner. Profit mark-up of 20% is his target. Welcomes idea of forming trader associations and buying from cooperative. Says he is ready to join formal chain if prices are stable and favorable. Competition from imports and free market policy a challenge to it. Key threat is imported rice; retails at Kshs. 90.00 When milled. Hence, low-income consumers who are the majority prefers.

- SWOT ; check combined analysis
- Information flows; he frequently visits farmers and they live in same village, hence pass information easily. Key is information on price, and available quantities.

6: FGD with farmers and stakeholders

Transcript of the proceedings and discussions on 28/7/2017 at Ahero farmers training hall.



List of Stakeholders- Matrix drawn on chart

- NIB- Operation and Maintance of the scheme
- LBDC, WKRM, NCPB- Buy rice from cooperative
- Brokers-Buy rice at farm gate
- Local traders- own small mills and buy rice at farm through brokers and farmer groups e.g Jay Jay traders

- Supermarkets – Nakumatt, Tuskeys, Uchumi. Mainly buy rice from formal chain millers
- Schools, Universities, hospitals- buy rice in bulk from formal millers also
- MoA- Extension, policy and input subsidies
- KEPHIS- certification of seeds
- Transporters; Local motorbike owners and tractor owners give transport services e.g Owade in Ahero scheme.
- Feed manufacturers; buy bran and straws from millers and farmers
- Farmers – produce rice; 530 in Ahero
- Cooperative; Ahero cooperative buy rice from members
- Self-help groups; production and marketing functions

Marketing channels –Chain map in flip chart

- Farmer → Cooperative → Government miller → Supermarkets/ Institutions – Urban consumers
- Farmer → Self-help group → Brokers/local traders → Local shops/markets – urban consumers, also rural
- Farmer → Broker/local trader → local shops/markets → Rural consumers

Costs/Revenues along the channels

- Farmers' production and marketing costs; Gross margin analysis in flip chart
- Revenues in chart (both formal and informal chain)

Constraints to formal market access

From the discussion, I noted the following as factors that constraint farmers from accessing the formal rice chain;

- Limited capacity of farmers to meet quality standards set by Government millers; among the key parameters are Moisture content, impurity percentage, maturity, among others. Farmers say the standard is too high, whereas the miller representatives expressed unwillingness of farmers to adhere to quality due to immediate payment by brokers.
- Corruption and non-accountability of farmer organizations; leaders and stakeholders strongly agreed that the cooperative society has not been transparent on its dealings with farmers and therefore farmers were not willing to sell through the society for fear of losing money. Quoting one leader "The society officials in last season embezzled Kshs. 1,200,000 and to date not recovered". The millers also said officials of the farmers demand money for them to sell rice on behalf of farmers.
- Delayed payments for paddy delivered; stakeholders agreed that payments could take up to 3 months to be paid by Government millers. The local traders on one hand pay promptly upon delivery of rice. The government millers said the procedure has been long due to accounting problems and curbing corruption. Farmers said they need immediate payment to meet their basic needs and other costs.
- Transport costs; The farmer leaders said it costs Kshs. 25 to transport 1 bag of paddy rice from farm to NIB stores. They save the cost when they sell on farm. From the store, they pay another Kshs. 80 to LBDA or NCPB millers.
- Inconsistent production; from the discussion and the cropping calendar presented by the Irrigation officer, it was evident that farmers produce rice for a short cycle in a year. For instance as per the calendar, production starts in June and harvesting in November to January. Meaning rice will be available for only 3 months in a year. This causes huge price fluctuations, as there are peak surplus rice hence low price (Kshs 30), and low supply season hence high price (Kshs. 50). Unreliable supply to millers is a big concern, as they cannot meet customer demand.
- Others which were highlighted include; weak management of farmer groups and cooperative leading to farmer apathy, low volumes delivered by farmers, and limited storage and handling facilities at the central yard in Ahero irrigation scheme.

Strategies that can be used/applicable to the current situation

- Upgrading of the Farmers role in the rice value chain; Farmers and stakeholders agreed on the need of farmers' through the cooperative to take up processing function through the WKRM. Currently Ahero multi-purpose cooperative society has 45% shares at WKRM, but they are dormant. They need to activate membership and be able to add value to rice. From this point, they can sell branded cooperative rice to institutions within the county of Kisumu.
- Utilization of the currently registered LBDC warehouses; farmers can deliver produce and get advance payments pending the sale of rice.
- Infrastructure rehabilitation; Due to high transport and handling costs, they cannot deliver for central marketing. This they attributed to poor road network and drying as well as storage facilities. There is need to address the infrastructure problem to lower the cost of production and marketing.
- Training, farmers need training on quality standards and how to attain them. They are not aware of additional benefits from meeting the quality and supplying formal markets.
- Enabling environment; institutional reforms to ensure payment system is faster and transparent. In addition, marketing policies need to be developed to cushion farmer from imports.
- Contract farming; with Government agencies.