

**FACTORS INFLUENCING THE USE OF WAREHOUSE  
RECEIPTS AS A FINANCIAL INSTRUMENT IN KENYA**

**By**

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## DECLARATION

This research project proposal is my original work and has never been presented for examination in any other university

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D61/76221/2012

This project is submitted for examination with my approval as a University Supervisor.

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## **DEDICATION**

I am proud to dedicate this study to my two great loving daughters Sakshi and Shriya and my beloved husband Prakash.

For their endless love, encouragement and understanding.

Without their love , support and encouragement my studies would have been an impossible task to undertake.

## **ACKNOWLEDGEMENTS**

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Thank you and God bless you all.

## ABSTRACT

If agriculture is to contribute to the development of the economy, and farmers are not to be left behind, then agriculture needs a proper credit system. Postharvest credit in the form of warehouse receipt finance has proved to be a critical component for agriculture sector growth in emerging economies. Efficient warehouse receipt finance allows farmers to avoid selling directly after harvest, when prices are depressed. It encourages storage by reducing the cost and by increasing liquidity in entire commodity chains, which in turn reduces price volatility. By giving farmers access to a new financing tool, it enhances their ability and incentives to invest in production.

This study assess whether Warehouse Receipt System has made any contribution in improving smallholder farmers' access to financial services. In methodology a survey research to explore the existing status of the variables at a given point. In this study, the researcher preferred to carry out survey to find the principal components affects on warehouse receipt system. The study used cross sectional design for in total 100 where 80 smallholder farmers and 20 warehouses . Quantitative and qualitative techniques were used to analyze the data. The motives that were used to influence smallholder farmers to join WRS included price, access to credit and access to market.

The results of the study suggest that the use of warehouse receipt as financial instrument has impact of the factors such as awareness of the benefits of the WRS , availability of licensed & supervised public warehouses, availability of financial packages and Government policies. The study reveals that the farmers avail the loan against their crop but the awareness of the benefits of the warehouse receipts and activity in informal financial market limits the use of the warehouse receipt as financial instruments.

It is hoped that this paper will encourage all those interested in agricultural development in Kenya to improve the conditions for and use of warehouse receipt finance , and that it will assist them in doing so.

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## **LIST OF ABBREVIATIONS**

ADB-Agricultural Development Bank,Ghana

EAGC-Eastern African Grain Council

KENFAP- Kenya National Federation of Agriculture Federation

KMDP-Kenya Maize Development Programme

KNBS – Kenya National Bureau of Statistic

NCPB-National Cereals and Produce Board,Kenya

RATES-Regional Agricultural Trade Expansion Support

RBI-Reserve Bank of India

UNCTAD-United Nations Conference on Trade and Development

WPI-Wholesale Price Index

WR – Warehouse Receipts

WRS-Warehouse Receipting System

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Farmers, traders, processors and exporters seeking access to finance for working and investment capital purposes are often unable to meet banks' demands for collateral. The types, quality and amounts of collateral that these enterprises can provide often do not meet banks' criteria, leaving such enterprises unable to secure their borrowing requirements. The use of stored commodities as collateral is one way of overcoming collateral constraints and enhancing agricultural lending. In addition, having in place a reliable and cost-efficient system for issuing warehouse receipts not only enhances commodity financing, but also contributes to improving the efficiency and transparency of commodity marketing by providing independent grading and quality certification to all the actors involved in commodity chains (Höllinger, Rutten and Kiriakov, 2009). It allows commodity producers, processors and traders more flexibility in the timing of their sales and purchasing, by enabling easy refinance for the goods that they have in storage. This study discusses improving the performance of agricultural markets in Kenya and the constraints in developing regulated warehouse receipts (WR) systems which are accessible to smallholders.

Warehouse receipts (WR) are documents issued by warehouse operators as evidence that specified commodities of stated quantity and quality, have been deposited at particular locations by named depositors (Coulter and Onumah,2002). The receipts can be transferable or non-transferable. Transferable warehouse receipts allow whoever has access to the title to transfer its ownership to someone else. A non-transferable title must go through a particular process often controlled by a regulator to transfer ownership. As food is properly taken care at warehouse stores, WRS is global need for food security.

Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. According to the Kenya Food Security Steering Group's Report, overall about 1/3<sup>rd</sup> of Kenya's population is food insecure. Food security impacts the inflation of the country. Kenya's annual inflation decreased from 14.0 per cent in 2011 to 9.4

per cent in 2012 (KNBS, 2012). The decline in inflation was largely attributed to better food supply resulting from favorable weather conditions.

Inflation is the percentage change in the value of the Wholesale Price Index (WPI) on a year-on year basis. It effectively measures the change in the prices of the goods and services in a year. Inflation occurs due to an imbalance between demand and supply. Thus excess or deficit in the food can also affect the inflation of the country (Blanchard and Olivier).

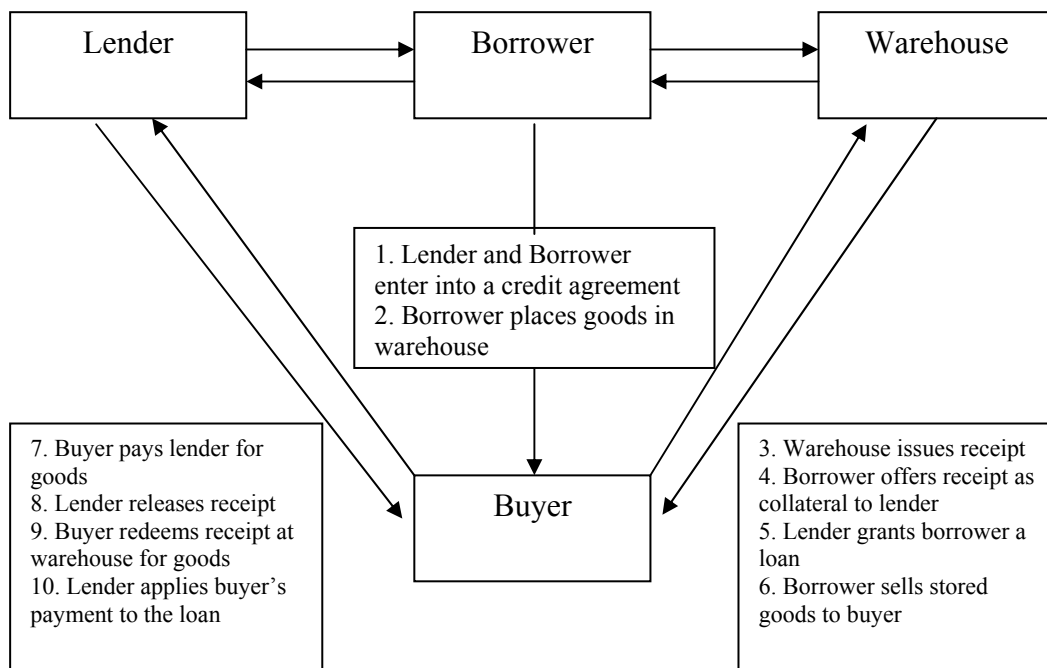
A well developed WRS can provide a focus for development of the entire commodity chain, providing incentives for a range of different parties, including farmers, financiers, traders, processors, public sector buyers, food aid managers and investors in storage capacity. It Improves food security through a “buy back” function that allows rural farmers to purchase their food stored at a warehouse during vulnerable periods. Warehouse Receipts (WRS) can greatly facilitate financing of agriculture as it could serve as highly credible collateral for agricultural credit (Mahanta,2012). Hence the widespread acceptability and faith in the integrity of WRS based system is essential for modernization of agricultural financing.

### **1.1.1 Warehouse Receipt System**

Warehouse receipt finance uses securely stored goods as loan collateral. It is sometimes called “inventory credit” (FAO, 1995). It allows clients, such as farmers, traders, processors and others, to deposit commodities in a secure warehouse against a receipt certifying the deposit of goods of a particular quantity, quality and grade. Clients can then use the receipt as a form of portable collateral to request a loan from a financial institution. The basic features of warehouse receipt finance are relatively simple and straightforward, as illustrated in Figure 1: the client deposits a certain amount of goods into a warehouse in exchange for a warehouse receipt. The warehouse receipt conveys the right to withdraw a specified amount and quality of the commodity at any time from the warehouse. The warehouse manager is liable for guaranteeing the safety and quality of the stored commodity.

The warehouse receipt can then be transferred to a bank, which provides a loan equivalent to a certain percentage of the value of the stored commodity. At maturity, the client (e.g., a farmer) sells the commodity to a buyer who then either pays the bank directly, or pays the borrower who then repays the bank. On receipt of the funds or an acceptable payment instrument (e.g., a confirmed Letter of Credit), the bank surrenders the warehouse receipt to either the buyer or the seller (depending on the specifics of the transaction), who then submits the warehouse receipt to the warehouse, which releases the commodity. In case of default on the loan, the bank can use the warehouse receipts in its possession to take delivery of and sell the commodity stored in the warehouse, to offset the amounts it is due (Höllinger, Rutten and Kiriakov, 2009).

**Figure 1 :** Basic features of a warehouse receipt financing transaction



Source: Kreshavan, 2008

Implementing the warehouse receipt system has certain benefits. First, Facilitating trade by assisting in assembling and reducing information asymmetry between counter-parties. The warehouse operator can provide information on inventories available, on demand from major buyers and guarantees delivery of commodities. Second, enhancing marketing efficiency in agricultural markets by facilitating transparent trade in agricultural commodities between producers and large traders or

processors thus reducing the marketing chain and margins. The WR provides increased storage which serves to moderate seasonal price variability and post-harvest losses which are significant in the region.

Third, easing access to rural finance through deposits from farmers and traders. There was decrease in cost of credit .It will assist formalize trade transactions and associated risk. Fourth, helps in Mitigating price risks. It helps as a better and transparent price discovery mechanism for farmers' produce. The system will facilitate development of simple mechanisms by which producers, lenders and traders can secure a floor price by locking in a fixed future price.

Fifth , “Cost-effective management of public food reserves”. A WR system will contribute by enabling farmers obtain better prices, allowing farmers to store their produce and sell when the price is favorable. Management of reserve stocks was more cost-effective as the WR system will allow government access to more reliable data on private stockholding, enabling it to forecast shortages more realistically. It will also create a more transparent system for procuring and selling Government stocks, using WRs. Large organizations will no longer be needed to manage strategic food reserves, thus reducing the scope for corrupt practices ( Laibuni, Njenga, Kiriga, Omiti and Ikiara, 2012).

### **1.1.2 Warehouse Receipts as Financial Instruments**

A financial instrument is a real or virtual document representing a legal agreement involving some sort of monetary value. In today's financial marketplace, financial instruments can be classified generally as equity based, representing ownership of the asset, or debt based, representing a loan made by an investor to the owner of the asset. According to IAS 32 and 39, a financial instrument is the written legal obligation of one party to transfer something of value, usually money, to another party at some future date, under certain conditions.

A financial instrument is a tradable asset of any kind. Financial instruments can be thought of as easily tradable packages of capital, each having their own unique characteristics and structure. Examples of types of financial instruments are shares in

a company, cash of any currency, gold, oil and other commodities, options, futures, CFDs.

### **1.1.3 Relationship between Warehouse Receipts and Financial Instruments**

Smallholder farmers are typically isolated from markets, have limited selling alternatives, lack contact with downstream buyers, are unable to enter into contractual relationships (due to lack of trust), are usually obliged to accept the buyer's assessment of weight/volume and quality and, find it difficult to hold the crop for better prices. Farmers (or groups of farmers) can overcome these constraints by depositing their crops in a warehouse that dries, cleans and grades them according to established standards, and holds them until they wish to sell (Coulter, 2009).

The basic principle of warehouse receipt financing is that commodities stored in warehouse are used as collateral for a loan. The grain production and management for smallholder farmers appear to be fruitful when WRS concept is applied. The factors that contribute to its success include increase capacity of smallholder farmers, support services (financial and insurance) and good enabling environment. Small-scale farmers have always struggled to pay their debts. They often sell off their goods when harvest season begins so they can hold onto their crops until the lean season, when the price and potential for profits are at their highest. However, improper preservation or drying techniques, coupled with inadequate storage facilities, can force small farmers to let commercial or foreign traders reap the rewards of seasonal price swings. By storing their goods in a reliable warehouse until the price increases while using the goods as loan collateral, farmers may access funds before they sell their goods. Warehouse receipts are often administered to producer groups, instead of individuals, which helps the flow of market information. Warehouse receipts also can create price transparency (KENFAP, 2011).

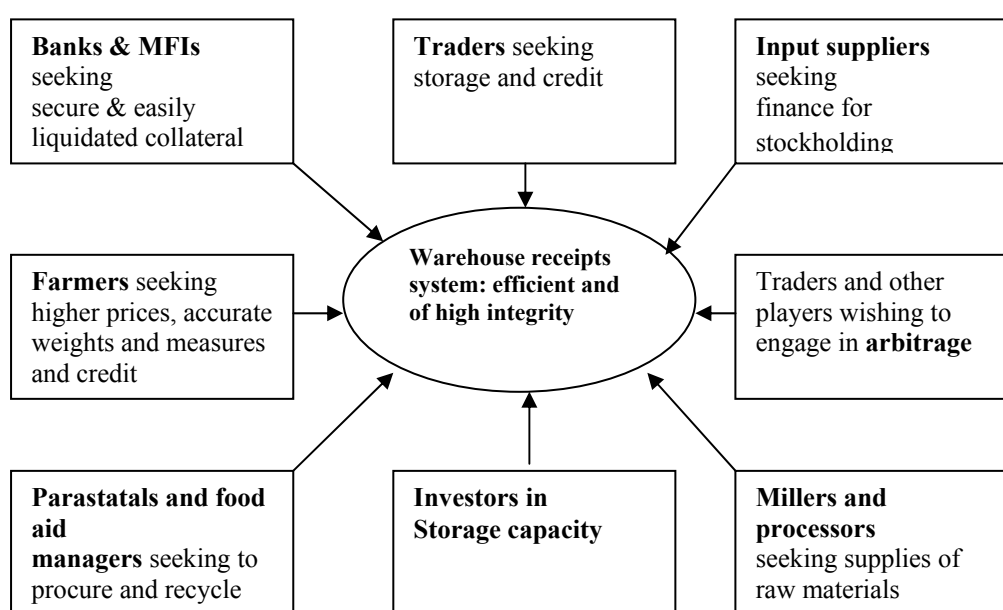
A Warehouse Receipt system provides a way to reduce the need of government agencies in procurement of agricultural commodities. Government intervention in agricultural markets usually has two main objectives: to support prices, by buying directly from producers, and to guarantee a measure of food security. In order to support prices, governments can accept Warehouse Receipts when prices drop below a support floor, rather than taking delivery of physical inventories. Since Warehouse



Receipts guarantee the existence of stocks, governments can achieve their food – security objectives by merely holding these receipts (RBI,2005).

A well developed WRS can provide a focus for development of the entire commodity chain, providing incentives for a range of different parties, including farmers, financiers, traders, processors, public sector buyers, food aid managers and investors in storage capacity (Laibuni, Njenga, Kiriga, Omiti and Ikiara,2012). This is illustrated in Figure 2.

**Figure 2.** Parties with incentives to participate in WRS



In most developing countries there is a dual system of credit, a formal and an informal market. In the formal market traditional banks lend to well-established borrowers, mostly in urban areas. The informal market is geared towards the general population, mostly in rural areas and is typically associated with substantially higher interest rates. Many small farmers cannot afford such loans and end up selling most of their harvest at the low post-harvest prices (Varangis and Larson).

Warehouse receipt systems are effective in decreasing the cost of credit for farmers in rural communities by eliminating asymmetric information on the quantity and quality of the goods and by subsidizing storage. Once a warehouse receipt system is established, it will influence the credit market in three ways, first by decreasing

storage costs, second by eliminating the asymmetric information on the quality of the good and third by establishing the use of collateral (Coleman and Valeri, 2006).

First of all the quality of the commodities becomes common knowledge. Second, the commodity is now in the hands of a third party (the warehouse owner) and can be used as collateral. The result, however, is that financial markets become integrated and the cost of credit decreases for borrowers in rural communities. Warehouse receipt systems therefore affect the income distribution within villages shifting income from local moneylenders towards farmers. Thus it affects the purchasing power of the farmers causing effect on the inflation (Coleman and Valeri, 2006).

#### **1.1.4. Public Warehousing**

Public warehousing, this term does not imply public ownership, but refers to a company storing goods for public in general on behalf of whosoever wishes to deposit in the warehouse and issues to the respective depositors warehouse receipts that can be used for trading purposes or as collateral for raising finance. This in turn divided into three categories (Mahanta, 2012).

#### **Unregulated Independent Warehouses**

An unregulated independent warehouse set up by the company concerned sets up business, invests in grain handling and storage plant, and uses it to trade and provide a variety of other services, including storage and warehouse receipting. In principle these are purely private initiatives, where the company believes it can best serve its business interests by offering farmers and smaller market intermediaries a choice of marketing arrangements allowing for immediate or later sale. The main limitation to this approach is the small number of companies currently able and willing to offer the service. Banks would not trust many commercial operators to hold third party stock as collateral managers, probably only the largest companies in the Region (Mahanta, 2012).

#### **Warehouses regulated by the State**

Mainly controlled by the Government and follow some rules and regulations. In this case, the regulatory service is a State-controlled technical service which licenses

warehouse and ensures that they perform accordingly to a set of clearly understood rules. This may involve the suspension or revocation of licenses or taking over the management of failing warehouses (Mahanta,2012).

### **Warehouses Regulated by a Trade Body**

In this case regulation may be carried out on a purely contractual basis, or under delegation of State powers. This approach has quite good prospects in Kenya, though some significant hurdles must be crossed. EAGC (trade body) is already certifying warehouses in Kenya, and can do likewise in other countries. Its survival depends on its establishing fruitful dialogues with Governments. With its membership base, EAGC is moreover well placed to promote exchange trading (Mahanta, 2012).

#### **1.1.5 Private Warehousing**

This approach would allow private players to issue warehouse receipts against their own stock for the purpose of raising bank financing, and also of transferring title to buyers. Potentially this could increase market efficiency, to the benefit of both farmers and consumers at either ends of the chain. It could help establish a more level playing field among trading companies, making it easier for local operators to access low cost capital. It is moreover a sort of self-propelling innovation, building on the motivations of the proposing company.

It is however quite a risky approach. The regulator has little direct control over the actions of the licensee, who may move stocks around without the knowledge of a regulator who is not on site. Moreover, if such a warehouse operator goes bankrupt, it may also be difficult for the bank to prevent priority being given to other creditors (Höllinger, Rutten and Kiriakov, 2009).

#### **1.1.6 Farmer Focused Approaches**

These are approaches involving the storage and financing of commodities deposited (more or less exclusively) by farmers with the objective of supplying local food needs in rural areas or bulking product prior to marketing. There is a general need to increase farmers' role in crop storage. If more is stored locally in villages, rural people was more food secure in the lean season, notably households who produce insufficient to cover their needs, or who sell early for financial reasons. Occasionally rural storage initiatives have resulted in large increases in seasonal storage, lessening

the need for States to establish price stabilization mechanisms (Höllinger, Rutten and Kiriakov, 2009).

### 1.1.7 Warehouse Receipting in Kenya

In Kenya, there were two pilots-certified WRS (EAGC & NCPB) implemented in Kenya, and a number of community cereal Banks (Uncertified WRS) which involved grain bulking in the rural areas. The rolling out of warehouse receipting for agricultural produce by the National Cereals and Produce Board, Kenya has sent a wave of excitement among maize farmers across the country. Warehouse receipting was introduced in Kenya at a time when the main staple food maize went from a period of excess supply to a period of shortages. The first ever warehouse-receipting programme in Kenya was at the Nakuru Wheat Silos in April 2008 by the Eastern African Grain Council (EAGC), in conjunction with Kenya Maize Development Programme (KMDP) and Regional Agricultural Trade Expansion Support (RATES). So far, Equity Bank has embraced the development, issuing loans to farmers with warehouse receipts as collateral (Laibuni, Njenga, Kiriga, Omiti and Ikiara, 2012). When the WRS was conceived, Kenya did not have a legal framework for warehouse receipting to govern its intended warehousing, trading, and financing services. Therefore, EAGC, a self regulatory body, took the lead role in drafting WRS regulations.

Table 1 : The Total capacity of warehouse is as follows (Jimnah Mbaru, 2009):

Region	Total Storage Capacity ( X 90 Kg Bags)	Total Storage Capacity (In MT)
Nairobi / Eastern	3,720,500	335,180
North Rift	4,378,000	394,414
South Rift	4,870,000	438,739
Western	2,221,000	200,090
Nyanza	1,737,000	156,486
Coast	973,000	87,658
Northern	2,504,000	225,586
TOTAL	20403500	1,838,153

Due to the political situation and policy constraints, it is taking much longer than hoped to establish the WRS in Kenya.

## 1.2 Research Problem

Agricultural markets operate in dynamic environment which is greatly influenced by supply and demand forces (KENFAP, 2011). These forces coupled with the effects of climate change and government policies impact significantly in terms of planning for production and access to markets. Also these changes lead to excess or deficit of the food which contributes the inflation in the country. Inflation in Kenya is due to increase in commodity prices. Kenya has experienced continuous price escalation of staple food commodities in the last decade that has resulted into food insecurity, despite consecutive years of good harvest. Also delay in sale of commodity impacts the price increase of the commodities. WRS is important because it can allow farmers to delay sales of recently-harvested crops by providing them with credit, storage space and market information until the market has stabilized and prices have increased. Food security could potentially be improved by storing their goods in a reliable warehouse until the price increases while using the goods as loan collateral, farmers may access funds before they sell their goods. Managing the supply and distribution of food commodities aim to maintain a stable inflation rate.

The empirical work has confirmed that both demand and supply side sectors significantly influence the food security and inflation. In Malawi, due to food security concerns Government has been heavily subsidizing inputs so that farmers can produce high yielding maize varieties, and this has caused a major increase in annual production (Makaiko and Khonje, 2009). In Hungary, government supported the warehouse receipt system mainly to help finance grain for exports. Storage subsidies along with exports support provided sufficient incentive for grain traders to use and benefit from the system. A large spectrum of banks (more than ten) is now involved in the public warehousing system (Höllinger, Rutten and Kiriakov, 2009). In Turkey, banks have traditionally been large users of warehouse receipt finance. For many decades, the country's important tobacco exports have been financed through warehouse receipt finance, and many Turkish banks have set up their own warehousing subsidiaries to store the goods that they are financing (Höllinger, Rutten and Kiriakov, 2009).

In Kenya attempts to establish a regulated WRS have focused on maize, which has a less organized market. There is no research found which helps to increase awareness

of WRS system to the farmers in Kenya. Therefore this study needs to do further research on the factors influencing the WRS system in Kenya.

### **1.3 Research Objectives**

The objective of the study is to identify the factors influencing the use of warehouse receipts as financial instrument in Kenya.

### **1.4 Value of the Study**

The key innovation in warehouse receipt finance is that it solves a financing and collateral problem. It offers the bank a safe and liquid collateral asset, which is easy to monitor. Warehouse receipt finance is a post-harvest financial product, applicable only when the farmer has already completed a harvest cycle. Therefore, the initial harvest cycle must be financed with the farmer's own funds or other credit resources. Farmers are not under pressure to sell immediately after the harvest, when all other farmers are selling and prices are low (Jessop, Diallo, Duursma, Mallek, Harms and Manen, 2012). Warehouse receipt finance lets farmers decide the best time to sell the crop. It helps in benefitting from in-year price changes. This increases the farms' income and helps with cash flow planning.

In Kenya, there is asymmetric information to the farmers regarding WRS. This research will help in increasing the knowledge and awareness of the WRS to the farmers. The research tells that regulated WRS can simultaneously help make agricultural marketing more efficient and improve access to finance for farmers, individually and through co-operatives. It will also create a more transparent system for procuring and selling Government stocks, using WRs. Large organizations will no longer be needed to manage strategic food reserves, thus reducing the scope for corrupt practices.

The study ,on the other hand, also states that WRS guarantees food security for the country, as farmers are encouraged to deposit their produce at government storage facilities (Ularo,2007). It is also argued that secure warehouse receipts can enable owners of inventory to borrow in currencies for which real interest rates are lower. This is possible where loans are made against inventory of an export commodity like coffee in Kenya, where coffee stocks are often financed in pound sterling.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

According to Budd (2001), grain warehouse receipts were first used in Mesopotamia in 2400 BC and the first form of paper money used in the United Kingdom were negotiable silver warehouse receipts. In this chapter two, section 2.2 discusses the theoretical literature. Section 2.3 gives the empirical evidences from various researches done before. Also in this chapter section 2.4 gives you the literature review of local Warehouse Receipt System. Last section 2.5 gives the summary of the chapter.

#### **2.2 Theoretical Literature**

The theory of finance suggests another approach for understanding the recent wave of financial innovations. The concept of warehouse receipt financing is not new, but, what is new is the innovative applications of collateralized lending to extend financing in markets where other attempts have failed. The creative use of basic principle behind warehouse receipts-collateralized lending-in order to design new financial instruments is making new wave in finance (Klapper, 2005)

##### **2.2.1 Theory of Storage**

The subsidy argument stems from the fact that farmers and the other participants in rural agricultural markets use the storage facility only a few months out of the year, so they end up not paying the full cost of storage. Working (1929) suggested that warehouse receipt systems were subsidizing storage in his study of wheat prices in the US. Once warehouses and warehouse receipts are established they eliminate the uncertainty on the quality of the good while at the same time subsidizing storage.

The theory of storage, as related to commodities, makes two predictions involving the quantity of the commodity held in inventory. When inventory is low (i.e. , a situation of scarcity), spot prices will exceed futures prices, and spot price volatility will exceed futures price volatility.

The theory of storage applies to any commodity that can be physically stored and makes two main predictions, both related to the quantity of the commodity held in

inventory. The Theory of Storage is centered on storage costs, the motives of stock holding on the physical market, the price discovery function of the futures markets (UBC, 2008). The theory explains the relationship between the spot and futures prices in commodity markets.

$$F(t, T) = S(t) + C_s(t, T) - C_y(t, T)$$

where

$C_s(t, T)$  = pure storage costs

$C_y(t, T)$  = convenience yield

$C_s(t, T) - C_y(t, T)$  = Net Storage cost

For seasonal products, the convenience yield must rise when the harvest comes near. The convenience yield is high when prices are high, and is otherwise low changes with the level of pure storage costs has as seasonal behavior.

The theory of storage suggests that the returns to this type of storage strategy should be approximated by the cost of carrying grain over time. In other words gains from storing hedged grain over time should be cancelled out by the physical and opportunity costs of storing grain. Physical costs of storing grain include warehousing, insurance and shrinkage, while opportunity cost comprises the forgone income that could have been earned by selling grain immediately and investing the proceeds (investment or holding period would equate to storage period) at the current bank interest rate. In reality commodities like corn and soybeans in certain market locations can often earn storage returns (made up of basis change) far in excess of the cost of storing grain. This is because production in these markets is highly seasonal, occurring at an annual harvest-time and because local supply and demand shocks impact basis levels across geographically diverse local grain markets, and costs of storing grain differ across market locations (Lorton and White, 2006).

### **2.2.2 Theory of Location**

Warehouse receipt financing means extending the sales period beyond the harvest season. As the harvest season approaches, small and marginal farmers find themselves in dire need of liquidity. The simple demand and supply equation results in prices falling to their lowest during harvest and gradually rising during the lean season.



Although farmers are aware of this seasonal trend, they cannot take advantage of this and benefit from it as they are hard put to organize immediate cash (Mor and Farnandes, 2009). Return on the crop sale and liquidity is related to the location of the warehouse where the crop is stored.

There is an extensive discussion in Location theory which seems to be a fruitful starting point (Rosen, 1974; Lancaster (1982). The location of firms (here warehouses) existing at any point of time could be described in terms of nearness to each other or in terms of nearness to consumer (here farmers). Then it would be easy to visualize a gap in the market if existing warehouses are too far apart in some sense.

For financial instruments the return (yield) and access (liquidity) are the two main characteristics. Assets become more liquid when the location of the warehouse is at near place and becoming more illiquid the farther away it goes (Marcello). In von Thunen's model, concentric rings of agricultural activity develop around a city. The production of perishable goods and/or goods needing to get to market quickly locate in the rings closer to the city and other activities such as ranching locate outer rings. Farmers want to put the money they earn from farming into the banks. Bankers want to consume agricultural goods. Therefore, transportation costs affect where goods are produced and where they want to store.

These theories give the clear prediction that to minimize production cost and transportation costs warehouses should be located close to farms.

### **2.2.3 Preconditions for Viability of Warehouse Receipt System**

In order for a Warehouse Receipt system to be viable, the economy within which it operates must meet certain conditions. The legal system must support pledge instruments, such as Warehouse Receipts, as secure collateral. The pertinent legislation must meet several conditions. These conditions includes that Warehouse Receipts must be functionally equivalent to stored commodities. The rights, liabilities, and duties of each party to a Warehouse Receipt (for example a farmer, a bank, or a warehouseman) must be clearly defined. Warehouse Receipts must be freely transferable by delivery and endorsement (RBI,2005).

The holder of a Warehouse Receipt must be first in line to receive the stored goods or their fungible equivalent on liquidation or default of the warehouse. The prospective recipient of a Warehouse Receipt should be able to determine, before acceptance, if there is a competing claim on the collateral underlying the receipt. The lack of an appropriate legal environment is probably the single most important constraint on the creation and acceptance of Warehouse Receipts in many developing countries (RBI, 2005).

## **2.3 Empirical Literature**

The overview of WRS approaches, indicate that WRS is a global concept and a lot of experience from industrialized countries such as United states of America, Europe, countries like Poland, Hungary, Slovakia, and Bulgaria, several countries in Latin America and developing countries (South Africa, Malawi & Zambia among others) provides important lessons on the path of development of WRS and challenges encountered.

### **2.3.1 Empirical Evidence**

Jayne and Chisvo (1991) examined WRS in Zimbabwe. They found that better storage facilities and localized warehouse receipting can help farmers hold back more crops, avoid circuitous transport and better assure their local food security. Coulter and Shepherd (1995) and Lacroix and Varangis (1996) found that the organization of regulated WRS system can strengthen the agriculture markets of Africa in a variety of other ways, notably by increasing market transparency. It provides an opportunity for farmers to organize, bulk up produce, sell to remote buyers and gain credit history. Coulter and Onumah (2002) argued that an effective regulated WRS can contribute to breaking the log-jam of low productivity, which affects much of African Agriculture.

Pal and Wadhwa (2007) showed that a well developed WRS can provide a focus for development of the entire commodity chain, providing incentives for a range of different parties, including farmers, financiers, traders, processors, public sector buyers, food aid managers and investors in storage capacity . WRS can help farmers retain more food for their local consumption requirements. This enables the farmers to avoid repurchase grains in the market price when they experience unanticipated shortages for consumption.

Mor and Fernandes (2009) found that WRS provides a platform for the introduction of other institutional innovations, notably grading, contracting and exchange trading. It is difficult to introduce grading systems into markets where most grain is traded informally and not graded. Buyers don't look for graded produce because it is unavailable, while farmers don't grade because of the lack of a price premium. By grading commodities on arrival at warehouses, it is possible to overcome this problem (UNCTAD, 2009). According to Gideon (2010) quality of warehouse and storage management skills tends to be highly variable in most African countries. Improving professional skills in the warehousing industry is necessary to ensure storage losses are to be kept at a minimum. Similar training and capacity building is required to enable traders and processing companies to utilize the WRS effectively managing their inventories. Devajit Mahanta (2012) stated that WRS can greatly facilitate financing of agriculture as it could serve as highly credible collateral for agricultural credit.

### **2.3.2 Experience with Warehouse Receipts Internationally other than Africa**

In the United States, the system, which is widely credited with streamlining the US agricultural marketing system and, up to the 1950s, playing a critical role in financing and development of the family farm, is organized under the US Warehousing Act of 1916, with subsequent amendments. Licensed warehouses have to meet and maintain key criteria in terms of physical facilities, capital adequacy, liquidity, managerial qualities, insurance and bonding cover (the latter protects depositors against fraud and Mis-management). Grain handling staff at the warehouses (weighers, samplers and graders) must also be licensed to carry on their activities, and commodities are graded to US standards (Department of banking operations & development, 2005)

In Bulgaria, The financial sector lends an annual 10 to 50 million euro against warehouse receipts, depending on market prices. Some local traders finance their grain trading operations completely on the basis of warehouse receipts and off-take contracts, without any fixed assets required by the banks. The Bulgarian Ministry of Agriculture's decision of 1999 to provide a three-year interest-free loan of US\$2.5 million for the initial capitalization of an indemnity fund was another important condition that supported the successful expansion of the system (Varangis and Larson, 1996)

In India, three new electronic commodity exchanges -- National Commodities and Derivatives Exchange Ltd. (NCDEX), Mumbai, Multi-Commodity Exchange Ltd. (MCX), Mumbai and National Multi-Commodity Exchange Ltd. (NMCE), Ahmedabad -- have been set up. Minister of Consumer Affairs, Food and Public Distribution, Prof. K.V.Thomas launched the Negotiable Warehouse Receipt System (NWRs). The WDRA was setup by the Government in October 2010 to regulate and development of warehouses in the country. Launching the system, Prof. Thomas said that the new initiative would help the farmers to avoid distress sale and become a tool of trade and facilitate finance to the farmers. It would also allow banks to improve the quality of their lending services in agriculture sector, increase the liquidity in the rural areas and encourage better price risk management in agriculture commodities. As part of the Rural Agricultural Finance and Food Security (RAFFS) Practitioner Learning Program (PLP), the Kahzi Kadaimaidai Farmers Federation (KKFF) and the Aga Khan Rural Support Programme-India (AKRSPI) collaborated to examine the impact of warehouse receipts activities and delayed marketing of agricultural products on the household food security of rural clients in India. KKFF and AKRSPI's study set out to discover whether better crop prices and increased income for rural farmers could ultimately lead to an improvement in food security at the household level. It was envisioned that household food security could potentially be improved in two ways: increased availability of key staple foods in the local market and better access to food as a result of additional income earned through sales of agricultural products (Department of Banking Operations & Development, 2005).

Indonesia's price fluctuation of certain commodities contributes 60% towards the national inflation. The Indonesian Minister of Trade, Gita Wirjawan on July 6th, 2012 stated that the government is currently designing the Warehouse Receipt System to be applied as an inflation control instrument in various regions in Indonesia. The Minister of Trade explained that the government is committed to develop the WRS system in various regions to manage the supply and distribution of food commodities that s aimed to maintain a stable inflation rate.

In Kazakhstan, it is estimated that international banks lend more than US\$1 billion a year against warehouse receipts, and local banks even more than that (Bryde, 2008).

The experience of these countries suggests that warehouse receipt finance continued to play a role during the early years of European Union (EU) accession and facilitated links between financial institutions and the agriculture sector (Höllinger, Rutten and Kiriakov, 2009). **Onumah (2013) explained that with the WRS is very helpful in strengthening agriculture finance through capacity building.**

### **2.3.3 Experience with Warehouse Receipts in Africa**

In Ghana, since 1989, the NGO TechnoServe has worked closely with the Department of Co-operatives and the Agricultural Development Bank (ADB) in Ghana in encouraging small-scale farmers to form cooperatives and use warehouse receipts to store their crops for sale in the lean season. ADB provides loans against the members' grain, at 75-80% of current market price, and the grain is stored in co-operatively owned warehouses. The scheme is concentrated in the Brong-Ahafo 'maize triangle' of Ghana – the major area of agricultural surplus, where annual price fluctuations are high.

From 1992 to 1996, participating farmers in this region were able to increase their profits on grain sales by an average of 94% per year, even despite the high interest rate of 42% charged on the short-term loans used. By 1997/98, more than 130 farmers groups were being assisted and for over 8 years, the loan repayments have been an impressive 100%. Although this system still relies on NGO support, it contrasts with commercial grain storage that is still under parastatals control and not as vibrant. Some of the benefits resulting from the scheme include: increased food production; better food security for farming families previously forced to accept low prices when selling at the same time (harvest); reduced post-harvest losses and higher rural investment (Coulter & Onumah, 2002).

In Niger, food security has always been an issue for the rural population. Although times have often been tough, the situation has worsened in the past few years because of the FCFA's devaluation and the subsequent increase in the price of imported agricultural inputs. Consequently, Niger's Ministry of Rural Development began a pilot warehouse receipt program in 1998 to help producer groups finance inputs for harvest which affects the country's inflation and food security (Innovations in Microfinance, 2000)

In Tanzania Charles Kimei, CEO of CRDB Bank Tanzania stated that with the help of WRS the government is Improving Food Security. In Tanzania, like many farmers, those in the Nyangao Agricultural Marketing Cooperative Society (AMCOS) in the Lindi lacked the collateral needed to access credit from banks. As other banks observe the profitability of the agriculture sector and gain confidence in Warehouse Receipts, the entire nation of Tanzania stands to gain from increased food production (Mashindano & Kihenzile,2013)

A widely accessible WRS system was successfully piloted in Zambia during the 2003/04 maize harvest season. The project was implemented by the Natural Resources Institute (NRI) with funding from the Common Fund for Commodities (CFC), DFID, the United States Agency for International Development (USAID), the government of the Netherlands and the International Fund for Agricultural Development (IFAD). During the pilot, about 6,600 tonnes of maize was stored under the receipt system. The stocks were fully financed by a local bank on highly competitive terms. The finance provided was fully repaid and depositors made net gains of over US\$ 35 per tonne, after meeting storage and finance costs. This success has sparked a good deal of interest and the programme's certified storage space is expected to rise from 8,000 tonnes in the 2003/04 season to just under 85,000 tonnes in the 2004/05 season.

In Nigeria , the two-year pilot phase of the warehouse receipt system covers Kano, Kaduna, Katsina, Zamfara, Kwara, Gombe and Oyo, and farmers can now use receipts for their produce as collateral for loans. This controls price volatility due to the availability of buffer stock, enabling farmers to sell produce at better price points.

#### **2.4 Local Research**

In Kenya, Weak law slowing warehouse receipting. The rolling out of warehouse receipting for agricultural produce by the National Cereals and Produce Board has sent a wave of excitement among maize farmers across the country. Many agree that if well implemented, it is set to revolutionize the agricultural sector, save farmers from the conniving middlemen and help the country in improving food security. However the lack of enabling legislation is militating against the

development of this industry. Most farmers are yet to trust it and many would rather bare the cost of keeping the produce themselves. Most of them feel there are no clear legal provisions on who bears the risk of loss; and the storage charges for the grains may escalate, especially as the Government does not guarantee the prompt purchase of the maize, only promising to give such farmers priority if and when the funds are available (Wandabusi, 2013).

On the other hand, most banks have been reluctant to accept the warehouse receipts as sufficient collateral for loans, further curtailing the gains the arrangement promises. The lack of an appropriate legal environment is the single most important barrier to the growth, creation and acceptance of warehouse receipts in Kenya (Wandabusi, 2013). In order for a warehouse receipt system to be viable, the legal system must support the receipts as secure collateral. Producers, traders and bankers also need maize pricing parameters in order to make appropriate credit decisions. Given the ever fluctuating maize prices across the year, there is need to come up with a simulation of reference prices based on historical pricing information, the closest regional trading markets offering prices for comparable maize qualities and quantities, and recent trends and demands from traders and buyers. A Warehouse Receipts Act is therefore long overdue in this country (Mbaru, 2009).

## **2.5 Summary**

Farmers in rural areas of developing countries tend to sell all their product right after harvest, at a very low price. Within six months of harvest prices increase up to 80% (Coulter and Poulton,2001). Working (1929) suggested that warehouse receipt systems were subsidizing storage in his study of wheat prices in the US. Warehouse receipt systems can effectively increase credit availability to farmers in rural areas of developing countries. When there is asymmetric information on the quality of the goods, costly storage and costly transport, there are no formal financial markets prior to the implementation of warehouse receipt systems.

Once feasibility and interest have been established in a country, further efforts to introduce a warehouse receipt system or upgrade an incomplete one should start with policy dialogue and broad-based raising awareness. Government officials, commodity

market participants and financial institutions need to be fully aware of all the short- and long-term benefits of a properly functioning warehouse receipt system and its advantages over localized, bilateral and private arrangements (Höllinger, Rutten and Kiriakov, 2009). Evidence suggests that unless key government and private sector stakeholders have a clear understanding and are strongly committed, efforts to introduce components of a warehouse receipt system can fail (Höllinger, Rutten and Kiriakov, 2009).

The study explains that the factors like awareness of the WRS to the farmers, storage cost of licensed & supervised public warehouses, lack of appropriate financial packages and Government policies influences the use of warehouse receipts as a financial instrument in Kenya.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter focuses on the research methodology employed throughout the research. It aims at giving the reader the validity and accuracy of data used throughout the work. The research methodology employed in this research work makes use of accurate data collection methods and the statistical method to analyze the data.

In this chapter 3.2 will explain the research design to be used for the study. Section 3.3 will tell about population and samples which were used to gather data. Section 3.4 helps to explain what data collection instruments were used to collect data for the study. The last section 3.5 discusses data analysis methods.

#### **3.2 Research design**

Survey Descriptive method is an easy research approach. The aim is to examine a situation by describing important factors associated with the situation. The study was a survey that involved studying the situation as it is by collecting both qualitative and quantitative data.

As the sample was taken from the farmers and different warehouses, it is decided that the conceptual model and analytical model can be used for this study.

#### **3.3 Population and Sampling**

##### **3.3.1 Population**

The study was carried out in areas of Rift valley, Western, parts of Nyanza and Eastern regions of Kenya. The inhabitants in the four regions are largely smallholder farmers who own an average of 3 acres of land and practice mixed farming. Maize and beans, sweet potatoes, kales, coffee, tea and sugarcane are in order of importance crops grown in the regions. The population for which this research was carried out mostly includes farmers, traders from all the regions. In these regions, NCPB Kenya covers many depots. The main ones covered by this Region Office include Nakuru, Kilgoris, Narok Silos, Kericho and Nyahururu. Lesiolo Grain Handlers, a private warehouse with storage capacity of 30000 metric tons is also available in this region

([www.lesiolo-grain.co.ke](http://www.lesiolo-grain.co.ke)). In Kenya agriculture employs 2/3 of the population. It is from this population that sampling for the research work was considered.

### **3.3.2 Sample**

Due to the nature and size of the population and the hurdles in studying all the elements of the said population, the research work is directed towards the use of simple random sampling to arrive at the conclusion in respect of the research work.

Considering the large population, purposive sampling method was used as what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. That's why sample of hundred numbers was taken to identify the awareness level of the farmers, the traders from Nakuru County towards the WRS.

### **3.4 Data and Data collection Instruments**

The use of various data collection methodology was expedient for this study as it requires more accurate and valid information from authenticated sources. The following methods of data collection were employed. A questionnaire was written and sent out to the no of farmers and public and private warehouses. The questionnaire is written by the researchers and a copy is attached in the appendix for your perusal.

Interviews were conducted by the researcher in order to get hand on information regarding the research from the most authenticated source. The interviews were conducted with executives of warehouses to give a detail picture of activities and how they were performing in view of the various hurdles.

Documentary evidences are other important sources of data collection that are very important to this research. These sources include Text books, Journals, Newspapers, Theses and project works, Internet, Central Bank of Kenya

### **3.5 Data Analysis**

Data analysis is the process of bringing order, structure and meaning to the mass of information collected. It involves examining what has been collected and making deductions and inferences, Kombo and Tromp (2006).

Before analyzing the data, the instruments were edited to check completeness, clarity and consistency of the responses. Qualitative data was analyzed using content analysis techniques. For quantitative, descriptive statistics, percentage and frequencies were derived and used. Presentations were done by use of tables, graphs as well as charts.

### 3.5.1 Conceptual Model

The conceptual model takes the form of mathematical function. The relationship among the variables is estimated using a function :

$$Y = f(x_1, x_2, x_3, x_4) \quad (1)$$

where Y is the dependent variable which will measure the usage of the WRS by farmers and traders.

Here  $x_1, x_2, x_3, x_4$  are the factors influencing the use of warehouse receipts as financial instrument in Kenya.

$x_1$  is awareness of the WRS to the farmers which was measured on scale from 1 to 4 . 1 indicates 'awareness to a great extent', 2 for 'somewhat' , 3 for 'very little' and 4 for 'not at all' .

$x_2$  is Storage cost of licensed & supervised public warehouses was measured on scale 1 to 3 where 1 for 'High', 2 for 'Moderate' and 3 for 'Low'.

$x_3$  is availability of bank loan facility against WR which was measured on scale 1 to 5 where 1 for 'always', 2 for 'very often', 3 for 'sometimes', 4 for 'rarely' and 5 for 'never'.

$x_4$  is Government policies available can be measured by either 1 or 2. 1 for 'Yes' and 2 for 'No'.

These variables are expected to be positively related to the dependent variable. Based on this, the variables affect the dependent variable. In this case ,SPSS was used in regression analysis and computation of coefficients.

### 3.5.2 Analytical Model

This is the algebraic expression of the conceptual model. It has the constant term, the coefficients and the error term. It is illustrated as:

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon \quad (2)$$

where  $Y$  is the dependent variable. It's a dummy variable which will measure the usage of the WRS by farmers and traders.

Here  $\alpha$  is a constant ;

$\epsilon$  is an error term

$\beta_1$  is the coefficient for variable  $x_1$

$\beta_2$  is the coefficient for variable  $x_2$

$\beta_3$  is the coefficient for variable  $x_3$

$\beta_4$  is the coefficient for variable  $x_4$

Here  $x_1, x_2, x_3, x_4$  are the factors influencing the use of warehouse receipts as financial instrument in Kenya.

$x_1$  is awareness of the WRS to the farmers which was measured on scale from 1 to 4 .  
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$x_4$  is Government policies available can be measured by either 1 or 2. 1 for 'Yes' and 2 for 'No'.

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## CHAPTER FOUR

### DATA ANALYSIS, RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents the data analysis, results and discussion of the results. Section 4.2 discusses summary. Section 4.3 explains the estimated model. Section 4.4 presents the discussion of the results. Lastly, section 4.5 is the summary of the chapter.

#### 4.2 Descriptive Statistics

This section Table 1 presents summary statistics for the data collected in this study. There were 83 farmers and 17 warehouses that were surveyed.

##### 4.2.1 Descriptive Statistics For farmers

Table 1: Descriptive Statistics for Farmers

	Awareness of benefits of WR	Loan Source	Availability of Loan	Crop Quality	Warehouse Location	Transport Cost	Insurance
Mean	3.3978	1.6265	4.4337	1.7951	2.4578	1.9879	2.8915
Median	4.0000	2.0000	5.0000	2.0000	3.0000	2.0000	3.0000
Maximum	4.0000	3.0000	5.0000	3.0000	3.0000	3.0000	4.0000
Minimum	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Std. Dev.	0.7954	1.0559	0.8581	0.5122	0.7207	0.7406	0.3829
Skewness	-0.9776	-0.0233	-1.4240	-0.2797	-0.9330	0.0189	-2.3997
Kurtosis	2.7597	1.7629	4.6469	3.0342	2.5119	1.8450	11.123
Jarque-Bera	13.4201	5.3002	37.432	1.0865	12.8674	4.6179	307.90
Probability	0.0012	0.0706	0.0000	0.5808	0.0016	0.0993	0.0000
Count	83	83	83	83	83	83	83

Source: Author's computations

Table 1 explains the descriptive statistics of the farmer with the help of mean, median, std.dev, skewness, kurtosis with the stated probability. The table explains that the component 'Awareness of WR system' has mean 3.39 which means that 'very little' knowledge is available to the farmers. Mean of 'Loan Source' shows that mostly farmers take the loan from 'Money Lenders'. 'Availability of Loan' has mean 4.43 tells that the loan from banks against crop is available rarely. Study shows that 'Crop

Quality' is fair. Mean of 'Warehouse Location' is 2.45 which explains that WRH available are far which ultimately gives the moderate transportation cost. The component 'Insurance Package' shows the mean almost near to 3 which gives the idea that there is no insurance package available.

Table 1 shows that awareness of WRS had a mean of 3.40. This means that there is very little awareness of WRS by the farmers. There was no wide variation in the responses of farmers as indicated by the standard deviation of 0.78. This variable is not normally distributed as indicated by the Jarque-Bera (JB) statistics of 13.42 with a p-value of 0.001.

#### **4.2.2 Descriptive Statistics for Warehouses**

Table 3 displays the statistics of warehouses in Kenya. The mean of 1.88 for public or private WR indicates that mainly in Kenya public warehouses are available. The WRH requirement is to store 'Dry' grain. This is explained by the mean 1.0. Storage cost of these WRH is centralized to mean 1.94 which shows that it is moderate cost. These WRHs are mainly 'partially utilized'. This can be clearly understood by its mean which is 1.94. These WRHs lend the unutilized space to third party. Security of the crop at these warehouses is moderate. These WRH store the both high and moderate quality crops at their stores. A mean of 1.1 of other services provided clearly explains that all these WRH provides the services like grading, drying, weighing very often. Component 'Availability of Bank loan' has a mean of 4.94 shows that it is very rarely available. 'Government Policy' has mean 2 which indicates that there is no such policy available to implement WRS.

Table 3: Descriptive Statistics for warehouse

	Public / Private WR	WR requiremen	Storage Cost	Capacity Utilization	Lend to 3 <sup>rd</sup> Party	Security of the	Quality of the	Other Services	Availability of Bank Loan	Insurance Package	Govt. Policy
<b>Mean</b>	1.88	1	1.94	1.94	1.06	1.53	2.00	1.12	4.94	2.06	2.00
<b>Standard Error</b>	0.08	0	0.06	0.06	0.06	0.12	0.00	0.12	0.06	0.25	0.00
<b>Median</b>	2.00	1	2.00	2.00	1.00	2.00	2.00	1.00	5.00	3.00	2.00
<b>Mode</b>	2.00	1	2.00	2.00	1.00	2.00	2.00	1.00	5.00	3.00	2.00
<b>Standard Deviation</b>	0.33	0	0.24	0.24	0.24	0.51	0.00	0.49	0.24	1.03	0.00
<b>Sample Variance</b>	0.11	0	0.06	0.06	0.06	0.26	0.00	0.24	0.06	1.06	0.00
<b>Kurtosis</b>	5.44		17.00	17.00	17.00	-2.27		17.00	17.00	-2.27	
<b>Skewness</b>	-2.61		-4.12	-4.12	4.12	-0.13		4.12	-4.12	-0.13	
<b>Range</b>	1.00	0	1.00	1.00	1.00	1.00	0.00	2.00	1.00	2.00	0.00
<b>Minimum</b>	1.00	1	1.00	1.00	1.00	1.00	2.00	3.00	5.00	3.00	2.00
<b>Maximum</b>	2.00	1	2.00	2.00	2.00	2.00	2.00	3.00	5.00	3.00	2.00
<b>Sum</b>	32	17	33	33	18	26	34	19	84	35	34
<b>Count</b>	17	17	17	17	17	17	17	17	17	17	17

Source: Author's computations

### 4.3 Correlation Analysis

#### 4.3.1 Correlations Analysis for Farmers

Table 4 shows the results of correlation analysis between variables in the study. The analysis clearly shows that there is negative relationship between the component 'Loan Source' and 'Availability of loan'. This means that due to different loan source

viz. money lenders, SACCO, the availability of the loan against crop from bank is less. There is also negative relationship between awareness of WR system, loan source with crop quality and lack of awareness of benefits of the warehouse receipts. This makes it hard to receive the loan against their crop. The table also shows that there is a negative relationship between crop quality with warehouse location and transport cost.

**Table 4: Correlation Analysis for Farmers Data**

	<b>Awareness of the benefits of WR</b>	<b>Loan Source</b>	<b>Availability of Loan</b>	<b>Crop Quality</b>	<b>Warehouse Location</b>	<b>Transport Cost</b>	<b>Insurance</b>
<b>Awareness of the benefits of WR</b>	1.0000	0.0192	0.1552	-0.0371	-0.0235	0.1531	0.2633
<b>Loan Source</b>	0.0192	1.0000	-0.1555	-0.3235	0.0832	0.1345	-0.1617
<b>Availability of Loan</b>	0.1552	-0.1555	1.0000	0.2877	0.0496	0.0275	0.3304
<b>Crop Quality</b>	-0.0371	-0.3235	0.2877	1.0000	-0.0401	-0.1351	0.1962
<b>Warehouse Location</b>	-0.0235	0.0832	0.0496	-0.0401	1.0000	0.6271	0.1378
<b>Transport Cost</b>	0.1531	0.1345	0.0275	-0.1351	0.6271	1.0000	0.1345
<b>Insurance</b>	0.2633	-0.1617	0.3304	0.1962	0.1378	0.1243	1.0000

Source: Author's computations

### **4.3.2 Correlation Analysis for Warehouses Data**

Table 5 shows the relationship between Storage Cost and Capacity Utilization. These components are negatively related. If storage cost increases then the warehouses capacity will not be fully utilized. Farmers will not be in favor to incur the high cost to store their grains. Due to this, warehouses mostly then lend the vacant space to the third party.





Table 6: Communalities of the Variables

	<b>Initial</b>	<b>Extraction</b>
<b>Avail Loan</b>	1.000	0.500
<b>Awareness of the benefits of WR</b>	1.000	0.745
<b>Loan Source</b>	1.000	0.460
<b>Availability of Bank Loan</b>	1.000	0.483
<b>Crop Quality</b>	1.000	0.566
<b>Warehouse Location</b>	1.000	0.838
<b>Transport Cost</b>	1.000	0.802
<b>Insurance</b>	1.000	0.544

Note: Here the Extraction method is used is Principal Component Analysis.

Table 7: Results of Analysis of Variance

<b>Component</b>	<b>Initial Eigenvalues</b>			<b>Extraction Sums of Squared Loadings</b>		
	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>
<b>Avail Loan</b>	1.099	13.743	13.743	1.099	13.743	13.743
<b>Awareness of the benefits of WR</b>	1.760	21.999	35.742	1.760	21.999	35.742
<b>Loan Source</b>	2.079	25.990	61.732	2.079	25.990	61.732

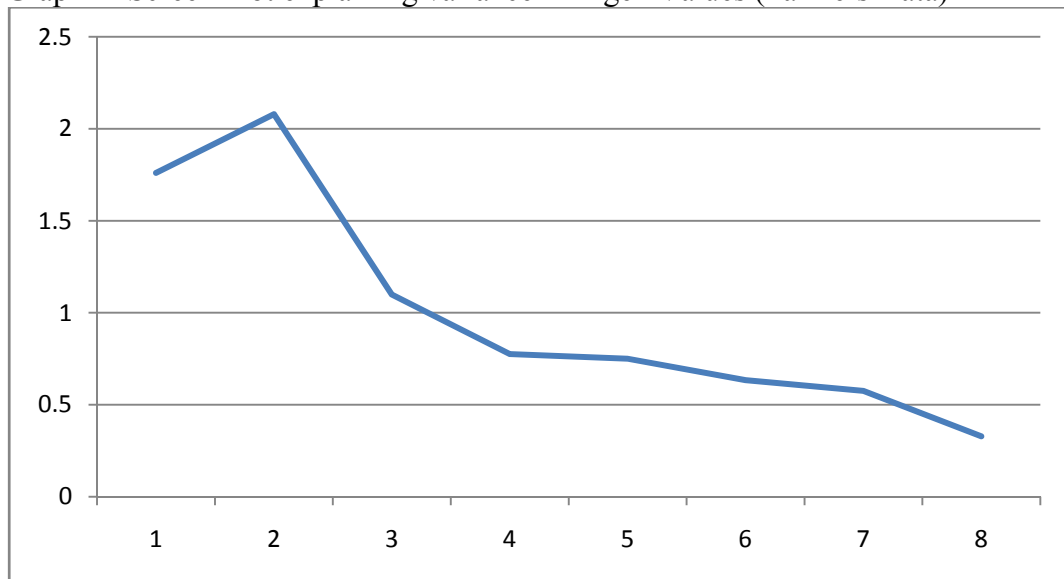
Table 7 displays the proportion of variance explained by each variable in percentage. The component ‘Loan Source’ explains 26% of the variance. Next ‘Awareness of WR system’ explains 22 % of variance. ‘Avail Loan’ explains only 14 % of variance. The other components explain less than 10% of variance. The results show that these three factors contribute cumulative of 61.732% of variance.

Table 8: Total Variance Explained

<b>Component</b>	<b>Rotation Sums of Squared Loadings</b>		
	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>
<b>Avail Loan</b>	1.630	20.377	20.377
<b>Awareness of the benefits of WR</b>	1.645	20.563	40.940
<b>Loan Source</b>	1.663	20.791	61.732

Table 8 shows the total variance explained after rotation of the matrix of factor squared loadings. The results show that ‘Avail Loan’, ‘Awareness of WR system’ and ‘Loan Source’ explain 62% of the variance in usage of the WRS. The component ‘Avail loan’ contributes 20%, ‘Awareness of WR system’ contributes 21% and the component ‘Loan source’ has variance of 21 %. Total cumulative variance turns to 62%. This clearly indicates that percentage of variance contributes more for the first three principal components. Rotated sums of squared loadings also show that the first three principal components have major impact on the variance percentage.

Graph 1- Screen Plot explaining variance in Eigen Values (Farmers Data)



With the help of Table 7 for total variance explained, the above screen plot is drawn. The results of this study shows that from a list of eight factors believed to influencing the use of warehouse receipts as financial instruments only 3 are important in the sampled. These factors are the ‘Avail the Loan’, Awareness of WR system and source of loan.

Table 9 shows the loading for the main three principal component derived from above. Component 1 is highly loaded on ‘Loan source’ and ‘Availability of Bank Loan’ compared to other factors. It shows the magnitude of 0.674 and 0.690. Component 2 shows the magnitude of 0.817 and 0.881 for the factors ‘Warehouse Location’ and ‘Transport Cost’. Component 3 has high magnitude of 0.756 for the factor ‘Awareness of WR system’.

Table 9: Rotated Component Matrix of Factor Loadings for Farmers Data

	<b>Component</b>		
	<b>1</b>	<b>2</b>	<b>3</b>
<b>Avail Loan</b>	-0.526	0.311	0.356
<b>Awareness of the benefits of WR</b>	0.318	0.269	0.756
<b>Loan Source</b>	0.674	-0.048	0.059
<b>Availability of Bank Loan</b>	0.690	0.070	0.051
<b>Crop Quality</b>	0.576	-0.264	-0.406
<b>Warehouse Location</b>	0.062	0.817	-0.408
<b>Transport Cost</b>	-0.012	0.881	-0.160
<b>Insurance</b>	0.660	0.263	0.196

Table 10 display the rotated component matrix for the relationship between the three main principal components with other factors. Component 1 had negative magnitude for factors awareness of WR system and transport cost. But having high magnitude of 0.748 for the factor ‘Crop Quality’. Component 2 showed the high magnitude for the factor ‘Warehouse Location’ and it is 0.915. Component 3 showed the high magnitude for the factor ‘Awareness of WR system’ and it is 0.794.

Table 10: Rotated Component Matrix

	<b>Component</b>		
	<b>1</b>	<b>2</b>	<b>3</b>
<b>Avail Loan</b>	-0.697	0.109	-0.051
<b>Awareness of the benefits of WR</b>	-0.333	-0.057	0.794
<b>Loan Source</b>	0.457	-0.037	0.499
<b>Availability of Bank Loan</b>	0.436	0.074	0.536
<b>Crop Quality</b>	0.748	-0.043	0.066
<b>Warehouse Location</b>	0.034	0.915	-0.006
<b>Transport Cost</b>	-0.194	0.866	0.123
<b>Insurance</b>	0.261	0.187	0.664

Extraction method : Principal Component Analysis. Rotation Method : Varimax with Kaiser Normalisation

Table 11: Component transformation Matrix

<b>Component</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>Avail Loan</b>	-0.625	-0.418	0.659
<b>Awareness of the benefits of WR</b>	-0.324	0.907	0.268
<b>Loan Source</b>	0.710	0.046	0.702

Extraction method : Principal Component Analysis. Rotation Method : Varimax with Kaiser Normalisation

Using the component matrix above first component identified as the ‘Avail Loan’. This factor is positively correlated to component 3 which is ‘Loan Source’. The second component was positively related to component no 3 which is Source of Loan. It had the highest loading of 0.268. The third component was positively related to component no 1 and 2 and had the highest loading of 0.710 on component 1.

Absence of approved storage facilities is one of the major issues facing by the smallholder farmers. The farmers have lack of knowledge about the system as there is no such marketing platform available in Kenya. Most farmers are yet to trust it and many would rather bare the cost of keeping the produce themselves. Most of them feel there are no clear legal provisions on who bears the risk of loss; and the storage charges for the grains may escalate, especially as the Government does not guarantee the prompt purchase of the maize, only promising to give such farmers priority if and when the funds are available (Standard Digital News,2013). Liquidity pressure also is one of the constraints for the use of WRS in Kenya. Heavily depressed farm gate prices, over-supply at harvest season and illiquidity in the trade leading to widen trade margins between the farm gate and mill gate. Lack of reliable information about available supplies from particular locations and transport costs are high.

Most banks have been reluctant to accept the warehouse receipts as sufficient collateral for loans. Thus the lack of finance or appropriately packaged financial services poses great challenges to agricultural productivity in Kenya. Likewise, farmers perhaps lack access to insurance instruments which can be used to manage risks to which might make them more vulnerable to vagaries of weather.

The initiatives lack legal and institutional framework to guarantee performance and minimize transaction costs. The lack of an appropriate legal environment is the single most important barrier to the growth, creation and acceptance of warehouse receipts

in Kenya. In order for a WRS to be viable, the legal system must support the receipts as secure collateral.

#### 4.4.2 Factor Analysis for Warehouses Data

Table 12 Communalities for Warehouse Data

	Raw		Rescaled	
	Initial	Extraction	Initial	Extraction
Private/Public	0.110	0.075	1.000	0.677
Storage Cost	0.059	0.057	1.000	0.970
Utilization	0.059	0.006	1.000	0.098
3 <sup>rd</sup> Party Lend	0.059	0.006	1.000	0.098
Crop Security	0.265	0.264	1.000	0.998
Other Services	0.235	0.228	1.000	0.970
Bank Loan	0.059	0.006	1.000	0.098
Insurance	1.059	1.056	1.000	0.998

Extraction Method : Principal Component Analysis

Table 12 shows the communalities of various factors for warehouse data analysis. The table showed the extraction for raw data and rescaled data. Table has shown that extraction for the rescaled data for the component storage cost was 0.970, crop security and insurance was 0.998. Extraction communalities for the component public or private WR was 0.677. Other factors had comparatively less extraction communalities.

Table 13 Variance Analysis for Warehouse Data

Initial Eigen Values				Initial Eigen Values		
Total		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Private/Public	1.387	72.805	72.805	1.387	72.805	72.805
Storage Cost	0.311	16.343	89.148	0.311	16.343	89.343

Table 13 shows the percentage of total variance explained in using the WRS. Raw data shows the percentage of variance for the component 'Private /Public WR' as 72.805%. Component 'Storage Cost' explained only 16% of variance. Total cumulative percentage for only these two components was 89%.

Total variance explained for rescaled data also was 34.357 for the component ‘Private/Public WR’ and 26.991 for ‘Storage Cost’. The cumulative percentage of variance for these two components was 61.448. This contributes major part.

Graph II- Screen Plot explaining variance in Eigen-values. (Warehouse Data)

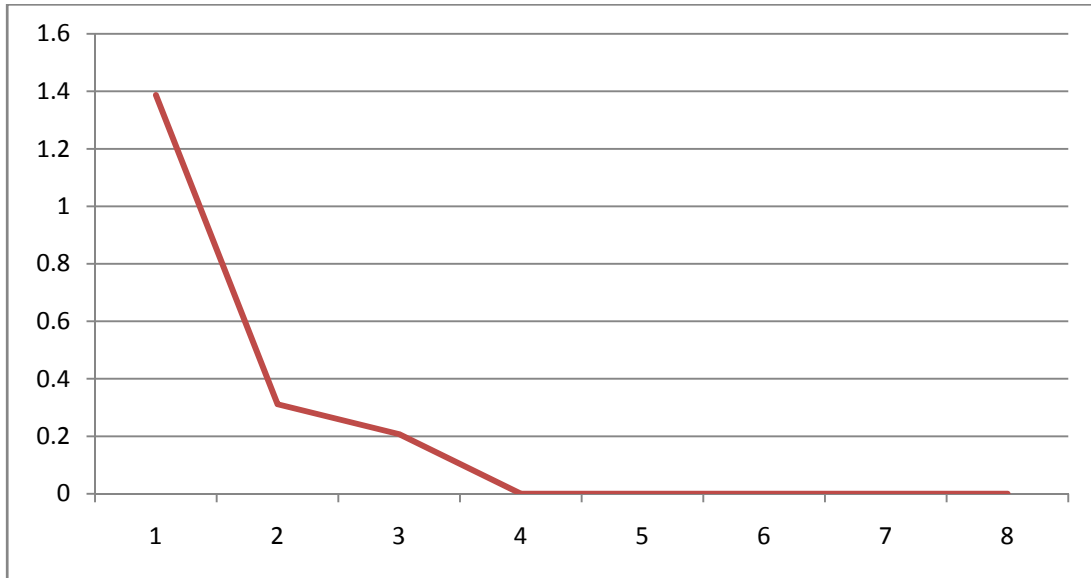


Table 13 shows the total variance explained. The results of this study shows that from a list of eight factors believed to influencing the use of warehouse receipts as financial instruments only 2 are important in the sampled. These factors are the use of private or public warehouse and storage cost of the particular warehouse.

**Table 14 Component Matrix for Warehouse Data**

	Raw		Rescaled	
	Component		Component	
	1	2	1	2
Private/Public	0.161	0.221	0.484	0.666
Storage Cost	0.085	0.223	0.350	0.921
Utilization	0.076	-0.002	0.313	-0.009
3 <sup>rd</sup> Party Lend	-0.076	-0.002	-0.313	0.009
Crop Security	0.511	-0.051	0.994	-0.099
Other Services	-0.170	-0.447	-0.350	-0.921
Bank Loan	0.076	-0.002	0.313	-0.009
Insurance	1.023	-0.101	0.994	-0.099

Table 14 shows the relationship among the main principal components with the other factors. Data analysis for raw data was showing that the component 1 had magnitude of 1.023 for insurance, 0.511 for crop quality and 0.161 for private/public WR. Component 2 had magnitude of 0.221 for private /public WR and 0.223 for storage cost. Data analysis for rescaled data was showing that the component 1 had magnitude of 0.994 for crop security and insurance, 0.484 for private/public WR. Component 2 had magnitude of 0.666 for private/public WR and 0.921 for storage cost.

**Table 15 Rotated Component Matrix for Warehouse Data**

	Raw		Rescaled	
	Component		Component	
	1	2	1	2
Private/Public	0.254	0.102	0.763	0.308
Storage Cost	0.237	0.028	0.978	0.115
Utilization	0.016	0.074	0.067	0.306
3 <sup>rd</sup> Party Lend	-0.016	-0.074	-0.067	-0.306
Crop Security	0.075	0.508	0.146	0.988
Other Services	-0.475	-0.056	-0.978	-0.115
Bank Loan	0.016	0.074	0.067	0.306
Insurance	0.150	1.017	0.146	0.988

Extraction method : Principal Component Analysis. Rotation Method : Varimax with Kaiser Normalisation

Above rotation component matrix for raw data also explained that component 1 had magnitude of 0.254 for the factor public/private WR and 0.237 for the factor storage cost. Component 2 had magnitude of 0.508 for crop quality, 1.017 for insurance, 0.102 for private/public WR.

Rotation component matrix for rescaled data explained that component 1 had magnitude of 0.763 for the factor public/private WR and 0.978 for the factor storage cost. Component 2 had magnitude of 0.988 for crop quality and insurance, 0.308 for private/public WR.

Table 16 provides a summary of the factor analysis result using principal components.

**Table 16 : Component Transformation Matrix for Warehouses Data**

Component	1	2
Private/Public	0.243	0.970
Storage Cost	0.970	-0.243



Using the component matrix above first component identified as the use of public or private warehouse. This factor is positively correlated to component 2 which is storage cost of the particular warehouse. The second component was highly loaded on component no 1 which is public or private warehouse. It had the highest loading of 0.970.

#### **4.5 Summary**

This chapter offered the analysis of data. From the findings, both the farmers and warehouses contributed to find the factors influencing the use of warehouse receipts as financial instruments.

The test results indicate that the three main principal components affecting are contributed by the farmers and two principal components are contributed by warehouses. The factors , taking loan against crop, awareness of WR system , source of loan are the components due to farmers and type of warehouse , storage cost are the components from warehouses. These factors shows the positive relationship between each other and affects

## **CHAPTER FIVE**

### **SUMMARY AND CONCLUSION**

#### **5.1 Introduction**

This chapter presents the summary and conclusion. Section 5.2 is the summary of the study. Section 5.3 presents the conclusion of the study. Section 5.4 discusses the limitations of the study. Lastly, section 5.5 gives the recommendations for policy while section 5.6 gives recommendation for further research.

#### **5.2 Summary of the Study**

Kenya is an agricultural dependent economy. Agriculture accounts for more than 24% of the Gross Domestic Product, and it provides employment opportunity to more than 80% of the rural population. The agricultural sector is primarily dominated by smallholder farmers. The Warehouse Receipt System (WRS) emerged as a means of overcoming the financial related problems, a means of improving agriculture and producers/ smallholder farmers' financial constraints. The study assessed and documented the factors influencing the use of WRS and the role of WRS as a means to improve smallholder farmers' access to financial services. Specifically, the study aimed at assessing the profile of smallholder farmers and identifying the factors influencing the use of WRS in obtaining credits from financial institutions.

The study employed a survey research design to collect data from farmers and warehouses. In total 83 farmers and 17 warehouses were surveyed. Data was analyzed using the factor analysis technique. The findings revealed that asymmetric information plays the great role in use of WRS system. Many small holder farmers are influenced with the informal financial market. Usually small holder farmers take loan from money lenders rather than banks against their crop. Awareness of the WRS is one of the major factors impeding the use the WRS in Kenya. The NCPB has more than hundred warehouses all over. The lack of an appropriate legal environment is the most important barrier to the growth and acceptance of warehouse receipts in Kenya.

In order for a Warehouse Receipt System to be viable, the legal system must support the receipts as secure collateral. Many agree that if well implemented, it is set to

revolutionize the agricultural sector, save farmers from the conniving middlemen and help the country in improving food security.

### **5.3 Conclusion**

Warehouse Receipts can greatly facilitate financing of agriculture as it could serve as highly credible collateral for agricultural credit. Hence the widespread acceptability and faith in the integrity of WRS based system is essential for modernization of agricultural financing. The importance of WRS stems from the fact that it can provide surplus-producing farmers with a market window which can help them secure the best possible deal, by allowing them to deal directly with downstream buyers and financiers, and overcome asymmetric power relationships within the market chain.

The majority of the farmers in the study area were not aware of the WRS. Activities in the informal financial markets also influence the implementation of the WRS in Kenya. Smallholder farmers mainly obtain loans from money lenders in their respective areas. Therefore, it is emerging that there is need to create awareness to the small holder farmers about the WRS.

Also, there is need for a law that clearly outlines the rights, liabilities, and duties of each party to a warehouse receipt, the farmer, the bank, and the warehouse employee. It should provide for warehouse receipts that are freely transferable by delivery and endorsement. Most importantly, the warehouse receipting law should clearly define collateral security issues and be made complementary to other statutes governing financing and the security interests of creditors.

### **5.4 Limitations of the Study**

This study had several limitations. First, the study was conducted on 100 samples of farmers and warehouses. This number is not fully satisfactory to generalize the findings on the factors influencing the use of warehouse receipts as financial instruments in Kenya.

Second, the study was limited to urban centres, Nakuru and Nairobi. Therefore, there is need to extent the study to key agricultural regions in the country.

## **5.5 Recommendations for Policy**

The study aimed at assessing the role of the warehouse receipt system as means to improve smallholder farmers' access to finance with evidence the data collected. Generally, based on the financial constraints encountered by smallholder farmers in acquiring financial services the followings are recommendations for future improvement. There is also a need to increase sensitization efforts among the smallholder farmers in order to enable a larger spectrum of the community members to become aware of the WRS practice and therefore, using it as a tool towards poverty reduction and at the end of the day improving their socio-economic livelihood status.

Governments in the region should priorities the integration of SACCOS into well managed rural financing network. Elaborate information system will facilitate trust building among the actors especially the banks. The Banks requires that warehouse receipts must be legal document which is credible and acceptable to be used as tool to transact business. Banks must be involved at an early stage in devising the scheme to ensure that they are satisfied with the enforceability of the receipts in case of default. To accommodate such risks, most banks will only loan a percentage of the current market value of the crop stored.

## **5.6 Recommendations for Further Research**

There should be a study to re-evaluate of storage losses in staple crop at farm level and financial losses through circuitous marketing in the country. A deliberate intervention from the government is needed to strengthen the capacity of WRS. This can be done through opening more opportunities for loans, ensuring better prices for different products and training community members on better WRS practices.

The research highly recommends that a system needs to be evolved by which Warehouse Receipts become freely transferable between holders as it would reduce transaction costs and increase usage.

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Appendix 1

Warehouse Receipt System Questionnaire

For Farmers

**SECTION A : General Information**

Name.: \_\_\_\_\_ Date \_\_\_\_\_

Place/Town: \_\_\_\_\_

No. Of Acres \_\_\_\_\_

Which Crops do you take : \_\_\_\_\_

What storage facility is available \_\_\_\_\_

What is capacity of storage \_\_\_\_\_

Do you take loan/credit against your crops: Yes  No

**SECTION B : Factors affecting use of WR System**

1) Are you aware of the benefits of the Warehouse Receipts –

To a Great Extent	<input type="checkbox"/>	Somewhat	<input type="checkbox"/>
Very Little	<input type="checkbox"/>	Not at All	<input type="checkbox"/>

2) Takes Loan against crops from : Money Lenders  Bank  SACCO

3) Availability of Bank Loan Facility against Warehouse Receipts :

Always	<input type="checkbox"/>	Very Often	<input type="checkbox"/>	Sometimes	<input type="checkbox"/>
Rarely	<input type="checkbox"/>	Never	<input type="checkbox"/>		

4) Quality of the crop when store at warehouse :

Good	<input type="checkbox"/>	Fair	<input type="checkbox"/>	Poor	<input type="checkbox"/>
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5) Location of the warehouse from your place :

Very Far	<input type="checkbox"/>	Far	<input type="checkbox"/>	Near	<input type="checkbox"/>
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6) Transportation Cost to take goods at warehouse:

High	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Low	<input type="checkbox"/>
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7) Availability of Insurance Package for the crops :

Often	<input type="checkbox"/>	Sometimes	<input type="checkbox"/>	Never	<input type="checkbox"/>
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Appendix 2

Warehouse Receipt System Questionnaire

For Warehouse

**SECTION A : General Information**

Name: \_\_\_\_\_ Date : \_\_\_\_\_

Place : \_\_\_\_\_

Category of Warehouse : Private Warehouse  Public Warehouse

Name : \_\_\_\_\_

Storage Capacity : \_\_\_\_\_

Crops stored at warehouse : \_\_\_\_\_

**SECTION B : Factors affecting use of WR System**

1) Warehouse Requirement – Dry  Temperature Controlled  Refrigerated

2) Storage Cost for the crops – High  Moderate  Low

3) Utilization of Capacity of the storage –  
Fully Utilized  Partially Utilized   
If 'Partially Utilized', do you lend the space to third party : Yes  No

4) Security of the crops – High  Moderate  Low

5) Quality of the crops stored – High  Moderate  Low

6) Other Services provided like grading,drying,weighing,refrigeration etc. –  
Often  Sometimes  Never

7) Availability of Bank Loan Facility against Warehouse Receipts :  
Always  Very Often  Sometimes   
Rarely  Never

8) Availability of Insurance Package for the crops :  
Often  Sometimes  Never

9) Any Government policy available :  
Yes  No