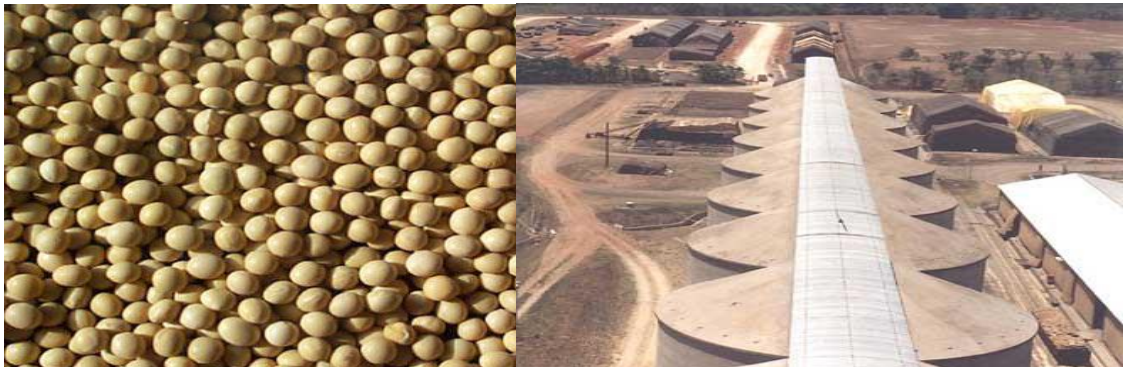


**The use of off-farm storage facilities in marketing of soyabeans
for smallholder farmers**

A case of the Warehouse Receipt System in Makonde District, Zimbabwe



**A Research Project Submitted to Van Hall Larenstein University of Applied Sciences
in Partial Fulfilment of the Requirements of Degree of Master in Management of Develop-
ment, Specialisation Rural Development and Food Security**

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Dedication

To Trinity my daughter and Tinashe my husband with love.

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If it had not been for the Lord who was on my side, I would have laboured in vain as such I give all the glory to the almighty God for all. Special mention goes to Pastor Farai and Busi Maphosa for all the emotional support. Finally I would like to thank my family and friends for being there for me always.

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List of acronyms and abbreviations

AREX	Agricultural extension
GMB	Grain Marketing Board
GMO	Genetically Modified Organism
FAO	Food and Agriculture Organisation
NRI	Natural Resource Institution
WRS	Warehouse Receipt System
WR	Warehouse Receipt
STF	Soyabeans Task Force
ZACA	Zambia Agricultural Commodity Agency

Abstract

Agriculture is considered as a source of livelihood for most of the rural people in Zimbabwe. As such most of the development policies programs and projects have been aimed at increasing agricultural productivity especially for the smallholder farmers. One of the crops being promoted in the smallholder sector is soyabeans. Though various programmes have been aimed at increasing productivity of soyabeans the marketing of the crop remains a challenge. The Soyabeans Task Force (STF) considers market based rural development as a critical element in medium to long term poverty reduction and food security. The STF in conjunction with the Natural Resource Institute (NRI) have been involved in projects aimed at improving the soyabeans marketing including soyabeans processing and storage. One of the projects in Makonde district aimed at improving storage of soyabeans by using the Warehouse Receipt System (WRS) was deemed not very successful as very few small-scale farmers are using the system. The research was therefore done to identify factors limiting or supporting the use of the WRS by small-scale farmers.

The study was carried out in Makonde district in Mashonaland West province of Zimbabwe, where there is a Warehouse Receipt System that has been in place since 2008 and approximately 25 smallholders have been reported to make use of the system. A case study was done to collect information about factors limiting and supporting this use. Eight WRS users and 8 WRS non-users represented the small-scale soyabeans farmers and the sampling method used was purposive. The warehouse operators (the company name is Nutrichem) were also interviewed. Another key informant interviewed was the (Agricultural and Rural Extension) AREX official who had an understanding of the WRS and worked with the farmers in the area. Interviews were done using semi structured interviews guided by a checklist. The respondents were narrating their stories guided by the researcher. Data analysis was done by analysing the narrative stories and the observed warehouse operations by grouping, sorting, making simple calculations, editing and summarising.

The findings of this research shows that the main factors supporting the use of WRS by the small-scale soyabeans farmers are reliability of the warehouse operators, the proximity of the warehouse in terms of relatively short distance from the farms and good road networks. The farmers also considered the WRS as beneficial in improving income and reducing post-harvest losses. The realisation of these benefits by farmers was a critical factor supporting the use of the WRS. On the other hand several factors were hindering the use of the WRS. The hindering factors identified include high opportunity cost of storage, high storage cost per tonne and inaccessibility of the warehouse due to lack of means of transport by the resource poor farmers.

Generally the study confirmed that the WRS was not benefiting the large majority of small-scale farmers who have limited assets and low yields and who are considered to be low income earners in the country. The study therefore further recommends the STF to reduce the impact of the limiting factors so as to make the WRS more relevant for the smallholder farmers. This can be done through facilitating formation of groups so as to minimise costs such as transport costs and transactional costs. The researcher also recommends that the STF increase communication facilities to improve the understanding of farmers about the system.

Key words: Use of Warehouse Receipt System, Small scale farmers, off farm storage

1 Introduction

1.1 Background of study

According to the census report of 2001 the projected population of Zimbabwe for 2012 is around 14 million with 65% of the Zimbabwean population living in the rural areas where 70% of the population are involved in farming as a livelihood (ZHDR, 2003). The country has an agro-based economy with agriculture contributing about 19% to the GDP of the economy (FAO 2012). The agricultural sector is dual, mainly characterised by two categories of farmers that is large scale farmers and the small scale farmers. The small scale farmers usually grow food crops for household consumption and the surplus is sold. They also produce cash crops such as tobacco, cotton and soyabeans although in smaller quantities as compared to large scale farmers.

Soyabeans is regarded as one of the major high value crop in Zimbabwe. This multipurpose crop can be used for human food, soya oil extraction, livestock feed, industrial purposes, and more recently, as a source of bio-energy (Myaka *et al*, 2005 in Chianu 2009 *et al* pg 35). There is a growing body of evidence from Southern Africa that soyabeans can be considered as one of the crops important in improving food security in the smallholder sector due to its ability to generate employment in the agro processing industry and income from sales of the product (GAIS 2011, Technoserve 2011). According to Devereux and Maxwell (2001), a cash crop is not a threat to food security (in terms of food availability and accessibility) if it doesn't compete with the food crops for labour and land resources within a household. In line with this soyabeans is an important crop in the food security of farmers as it doesn't compete with the staple crop maize but complement it in the production through its nitrogen fixing properties. Studies have shown that soyabeans-maize crop rotation produces a substantial increase in yields for both crops (Rusike *et al*, 1996). Despite the potential of the crop in improving food access and availability there has been a considerable decline in production since 2001 in the country. Prior to 2001, 90% of soya bean output was produced by large scale farmers and 10% by small-scale farmers. However, with the land reform of 2000 the number of small-scale farmers increased but the production diminished significantly (Techno serve, 2011). Although there has been considerable projects aimed at improving smallholder production of soyabeans, the increase in total production is marginal (GAIS 2012). Small scale farmers are still producing smaller quantities of the crop making marketing an issue for concern. Due to low production levels in soybean production for small-scale farmers, the farmers have often faced problems in selling their crops to processors who are usually located in cities. The result is that farmers get low prices for their crop whilst consumers purchase the soyabeans products at a higher price. This will be explained further in literature review on the marketing constraints in soyabeans production.

Though many studies have been done on soyabeans production there is less information on marketing of the crop. The costs of storage, transportation, and processing are an integral component of food price formation). Chianu *et al* (2009) asserts that crop market development is an integral part in employment creation and rural growth. Therefore the creation of markets can be done if proper marketing functions are set in place. Due to the seasonality of the soyabeans crop there are price fluctuations which in turn may reduce income for small-scale soyabeans farmers. One of the ways identified as cushioning farmers of volatile prices is for the farmers to perform the marketing function of storage. In this regard farmers will store their crop and only sell it when the prices are favourable on the market. Farmers usually suffer many losses due to poor storage of the crop as they wait for the appropriate time to sell their crop when prices are favourable. Other few farmers

who are able to deliver their crop immediately after harvest to the processors usually face delays in payment for their crop making it difficult for them to purchase inputs for the next season. Farmers also prefer to sell when they can get their income in a very short time frame for example two weeks however the processors may be able to pay after three months. According to a study carried out by Samuel et al (2000), in Nigeria post-harvest losses sometimes account to almost 60% of the produce, however in Zimbabwe, post-harvest losses in grain crops due to poor storage can account for more than 40% (GAIN, 2011). There has been little empirical evidence on the actual losses in soyabeans storage but the estimate for grain crops can also be used as a rough guide to the actual post-harvest losses in soyabeans.

1.2 Problem Definition

In order to minimise post-harvest losses during storage and also to improve access to finance, the Natural Resources Institute in collaboration with the Soyabeans Task Force (STF) in Zimbabwe implemented The Warehouse Receipt System (WRS) project in Zimbabwe. The project objective was to provide off-farm storage facilities in order to minimise post-harvest losses and/or transport costs for farmers when they ferry their produce to urban processors. The success or failure of the project was to be measured on the basis of increase in number of small scale farmers using the warehousing facility of which, it was assumed, inevitably resulted in minimising the post-harvest losses. In 2008 the STF contracted the private company Nutrichem to provide warehouse facilities to farmers in the Hunyani area of Makonde district. Under the warehouse receipt system, a farmer can deposit soyabeans, which meets the quality standards as defined at the designated warehouse. The farmer is then offered a receipt which acts as collateral in case the farmer needs credit to purchase inputs. The farmer will monitor price changes in the market and when prices become favourable for the farmer, he/she will notify the warehouse to sell the soyabeans. Though the project was not limited to small scale farmers only, this group of farmers was intended to benefit from it since they are the ones most hit by storage and transport problems. According to Ken et al (2011) the project was not successful on the basis that it did not expand significantly in terms of volume of soyabeans stored and number of farmers involved. Many small scale soyabeans farmers are still suffering large post-harvest losses and at the same time, warehouses are operating at low capacity.

1.3 Research problem, objective and research questions

The warehousing receipt system in Makonde, Zimbabwe is not functioning properly in the sense that very few small scale farmers are using the intervention. However there is inadequate information on factors affecting the use of the WRS by small scale-farmers and therefore no ideas can be developed to make this intervention more relevant for small farmers. The problem owner is the STF which represents the local management unit of the project.

The Research objective was to investigate the facilitating and hindering factors for small scale soyabeans producers to use the warehouse receipt system in soyabeans storage.

Following on from that, the main research question was formulated as: What are the factors facilitating or hindering small-scale soyabeans farmers in Makonde to use the Warehouse Receipt System?

Subsequently, the following sub questions were formulated:

- How accessible is the warehouse to the small scale soyabeans producers?
- What are the costs and benefits of using the Warehouse receipt to the small scale soyabeans farmers?
- How reliable is the Warehouse Receipt System to the smallholder soyabeans farmers?
- What is the role of government in the Warehouse Receipt System?

2 Literature Review

This chapter reviews different sources of literature related to the study. The chapter is divided into 6 main headings. Heading 2.1 presents the definition of terms used in the report. Heading 2.2 gives an overview on soyabeans production in Zimbabwe. The marketing of soyabeans is presented in 2.3. Heading 2.4 gives an overview of the storage of soyabeans in Zimbabwe. The cost and benefits associated with soyabeans storage respectively are presented in 2.5. The final subchapter 2.6 presents the review of literature on factors affecting farmers to be involved in the use of the WRS.

2.1 Definition of concepts

Marketing can be defined as the commercial functions involved in transferring goods from producer to consumer.

Agricultural marketing deals with all the activities, agencies and policies involved in the procurement of farm inputs by the farmers and movement of agricultural products from the farm to the consumers (Scrib, 2010). This covers numerous interconnected activities involved in doing this, such as planning production, growing and harvesting, grading, packing, transport, storage, agro- and food processing, distribution ,advertising and selling.

Storage/warehouse: The oxford dictionary defines storage as either the act of keeping goods or the space for keeping goods. Financial analysts define storage as the price charged for keeping goods stored. In this report storage facility is the use of a space which allows the keeping of a commodity (in this case soyabeans) for a particular time (Adapted from Chianu et al 2009). Based on this definition warehousing can be used interchangeably with the word storage.

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 (The depositor may be a producer, farmer group, trader, exporter, or processor). The whole process of using the warehouse receipts and storage space is the Warehouse Receipt System (WRS).

Small scale or Smallholder farmers is used more generally to describe rural producers, predominantly in developing countries, who farm using mainly family labour and for whom the farm provides the principal source of income (Chianu et al, 2009) .In Zimbabwe these are also characterised by their dependence on rain fed agriculture and land holdings of less than 6 ha (see annex 4 for landholdings in Zimbabwe).

Cost is a monetary valuation of effort, material resources, time and utilities consumed, risks incurred and opportunity forgone in production and delivery of a good or service (Barham and Chitemi 2009).

Opportunity cost in economics is defined as the value of the alternative forgone by choosing a particular activity (Myers, 2004). In this regard the author defines the opportunity cost of storing soyabeans as the income one would get if he/she had not stored the soyabeans.

Transaction costs consists of costs incurred in searching the best supplier/partner/customer (Myers, 2004). In the context of this study Transactional cost will be limited to the cost of transport and time used to find the best buyer for soyabeans.

Income is the profit or loss incurred in a business (Scrib, 2010). In the context of this research income is used to refer to the profit gained from marketing of soyabeans.

2.2 Soyabeans production in Zimbabwe

2.2.1 Climatic requirements for soyabeans production

Soyabeans grows well in most soils which are also suitable for maize production and in warm and moist climates. A temperature of 26.5 to 30°C appears to be the optimum for most of the varieties. Soil temperatures of 15.5°C or above favour rapid germination and vigorous seedling growth. The minimum temperature for effective growth is about 10°C. Soyabeans therefore is a tropical crop (Rusike et al 2000). The natural farming region 11 in Zimbabwe has this type of climate thus soyabeans is commonly produced in areas such as Makonde, Lion's Den, Guruve and Bindura (see map of Zimbabwe for farming regions on page 7). Considering that maize is the staple crop in Zimbabwe maize-soya rotation form a perfect combination in promoting crop diversification and soil fertility at the same time improving food security

2.2.2 Trends in soyabeans production

It is estimated that around 45 000 hectares of soyabeans were cultivated in the 2011/2012 growing season (Zimstats, 2012). Prior to the land redistribution programme of 2000 the crop was mainly grown by large scale farmers. The crop has become established as a smallholder crop in Zimbabwe changing the upheld notion that soyabeans is a crop for large scale farmers (Mupeperekwi et al 2006). The popularity of soybean is also generally attributed to its multi-purpose benefits as a cash and food crop, making its associated production, processing, consumption, and marketing activities much more lucrative. Aside from the seed itself, soybean is used to produce a variety of high-value marketable products which include, soybean cake (stock feed), soymilk, soy yoghurts, soy flour and soybean oil. Most of the soybean produced in Zimbabwe is however, primarily used in oil expression. In Zimbabwe soyabeans contribute 30% of all the cooking oil production while cotton seed and sunflower constitutes the remaining 70% (Zimstat 2012). There has been considerable increase in yield for soyabeans from 2004 for example soyabeans had an estimated average yield of 0.9 tonnes/ha in 2004/05 as compared to 1.2 tonnes/ha in 2009/2010 growing season (see table 1 below). The increase in yield without the increase in total area planted over soyabeans was not enough to meet the demand for the crop. The country imports 70% of its soybean needs from Malawi due to insufficient production (Techno serve, 2011).

Table 1 Trends in soyabeans production in Zimbabwe

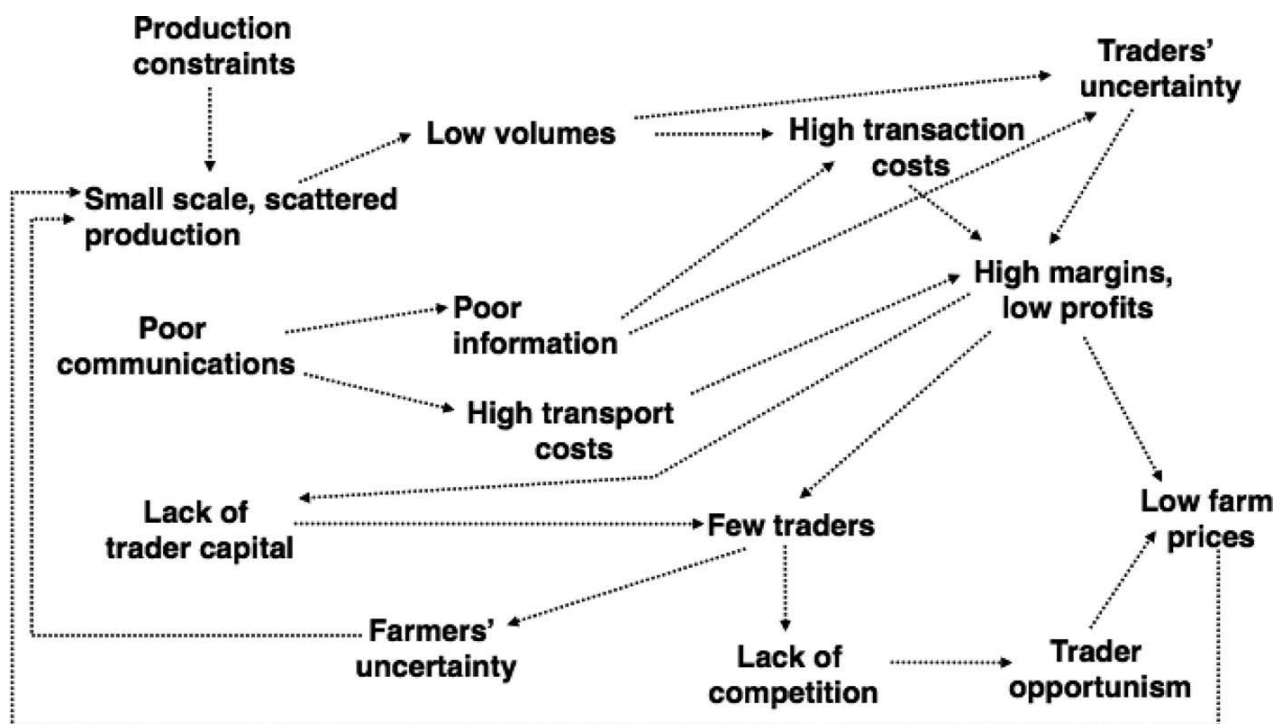
Year	1990 s	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12
Output in 1000MT	97	70	55	55	75	75	75	43	37	37	37
% Change in output			-21	0	36	0	0	43	14	0	0
Total Hactarage (*1000)	50	50	50	50	75	75	75	50	45	45	45
Yield (Ton/ha)	1.94	0.7	0.9	0.9	1	1	1	1.2	1.2	1.2	1.2

Source: Zimstats 2012

2.3 Marketing of soyabeans

Marketing of crops forms an integral component of food price formulation; this in turn has an impact on food security. Agricultural marketing transforms product over time, space and form through storage, transportation, and processing (Turner , 20112) .Though there are many other marketing functions such as buying and selling, market analysts usually use these three to analyse the performance of markets. The importance of market analysis lies in its ability to highlight constraints faced by farmers in the marketing of their crops which result in low profits. In the broader context of food security low farm gate prices implies that farmers do not receive the maximum potential income from their crop hence they would not have enough income to access their food needs thus they become food insecure. Farmers usually perform very little marketing functions of storage, transport, and processing. They usually sell their crops at low prices yet they buy the final products such as cooking oil at a high price. Thus the central problem of food marketing in Zimbabwe and many other developing countries can be summed up by the statement that ‘food prices are too high, crop prices are too low’ (Devereux and Maxwell 2001). Due to their scattered production and low levels of production small-scale soyabeans producers often are faced with high transaction costs of marketing. This is explained in figure 1below.

Figure 1 Marketing constrains in Small scale soyabeans producers



Source: Rusike et al 2000

Though the three main marketing functions mentioned above are equally important in market analysis, for the context of this research the marketing function of storage will be analysed in detail so as to see how the warehousing enhances market performance in the soybean sector. Considering the fact that soyabeans is a non-controlled commodity the pricing policy for soyabeans allows the free play of market forces of demand and supply. This

makes storage function important as farmers are likely to keep their crop and sell it when the demand for the crop is high and prices are relatively high.

2.4 Storage of soyabeans

Farmers have difficulties to choose every season including the decision whether to sell their produce immediately after harvest or store them to sell in future when prices become favourable thus performing arbitrage services (Barham and Chitemi, 2009). Despite this challenge on decision making, Coutler and Onuma (2002) say that farmers usually make rational decisions based on the claims and benefits of each strategy used. According to the online dictionary claims are defined as demands or costs from a certain intervention. Benefits are gains derived from the intervention. For instance if a farmer chooses to store his/her crop him /she still looks at the claims and benefit of each storage option. Two main forms of storage can be distinguished that is off farm storage and on farm storage.

2.4.1 On farm storage

This type of storage involves the use of storage facilities on the farm premises and the farmers readily access these types of warehouses. The main common types of off farm storage are seasonal storage sheds, cooperative storage and technologically improved rural stores (see figure 3 on summary of storage options). Some of the claims and benefits for on farm storage (adapted from Barham and Chitemi, 2009) are highlighted below. The advantages of on farm storage are: It allows the producer flexibility with regard to when and where the crop is marketed. It guarantees the producer that the space will be available each year. The time needed to transport and store grain during harvest may be less as the storehouse will be near. The major disadvantages to building on-farm storage are the size of the initial investment, the need to monitor grain throughout the storage period and the difficulty of underutilisation of the facility if the need for storage capacity decreases later. It should be noted that for the context of this research each option of on farm storage is not going to be explained in detail as the research is more oriented towards off farm storage

2.4.2 Off farm storage

According to Tawonezwi (2006) two different forms of off farm warehousing models can be identified, the private and public warehouses. The private warehouses are often common in agro processing firms. The phrase private owned is used as these are used solely for the benefit of the company not for farmers. Under the public owned three more distinctions can still be made depending on the ownership and control of the warehouse. In this case the term public relates to the fact that the farmers and/or other actors are able to use the warehouse. The common public warehouses are those owned by: independent warehouse operators (private), a trade body or the state model, and the private trader model. The WRS can be used in any of the three public warehouses. The one used in Zimbabwe for the WRS is the independent operated model which is also known as third party warehousing.

2.5 Public warehousing and the WRS

Warehouse operators may use the WRS when storing products for depositors. Warehouse receipts (WR) are issued by warehouse operators as evidence that specified commodities of stated quantity and quality have been deposited at particular locations by named depositors. In this case the depositors are small scale farmers and the commodity is soyabeans. The warehouse operator holds the stored soyabeans by way of safe custody but does not own the soyabeans. The receipts may be transferable, allowing transfer to a new holder for example a farmer may transfer the WR to a money lending institution which entitles the holder to take delivery of the commodity upon presentation of the WR at the

warehouse. The WRS can be used for warehouses operated by the state, a marketing board or an independent body and the system is open to the public hence the term public warehousing. The system has been used in Ghana, Tanzania and Malawi for example in storage for grain and soyabeans and the demand for use was due to seasonal fluctuations in market prices (Barham and Chitemi, 2009).

2.5.1 Benefits of using the WRS

As highlighted earlier that farmers usually make rational decisions when choosing whether to store their produce or sell immediately after harvesting based on the costs and benefits of warehousing. In a similar programme in Zambia the following benefits were associated with the use of WRS by small scale farmers (Gideon, 2002). Small-scale farmers were able to participate in modern agricultural commodity markets (both locally and within the sub-region) because they were encouraged and trained to comply with commodity standards under the WR system. This ensures that small-scale farmers will also be able to set prices instead of being price takers for agricultural commodities. With storage occurring in well-run warehouses or silos, their post-harvest losses will be reduced, thereby increasing the income of farm households. Access to input credit was enhanced as barter-type input credit operations became more liquid (with immediate financing against inventories accumulated being possible) and therefore more attractive to commercial operators. Lending to small farmers was also helped by WR system as it allows a database on their production to be developed and also enables them build a good track record with banks through obtaining finance secured with the receipts. IRR and KIT (2010) assert the importance of development of warehouses as a way of improving access to finance by farmer groups. They postulated that cooperatives need to invest in warehousing and transport as a way of improving access to finance. Although the importance of warehousing was stressed for value chain development and farmer organisations, the farmers' need for transport and/or warehousing is common to all farmers especially the small-scale farmers. The other benefit associated with using the WRS was the reduction in transactional costs as standard grades and scales will be used.

2.5.2 Costs of using the WRS

The costs for the use of the WRS can be either financial or non-financial and some of the costs realised in countries like South Africa and Ghana where they have used WRS for buffer stocks to caution farmers against volatile prices include opportunity cost of time and labour required to bring the produce to the warehouse. Few farmers have limited working capital to buy inputs such as fertiliser, seeds, chemicals and pay for labour hence they have great finance need which is usually experienced during the post-harvest season when farmers prepare for the next season (KIT and IRR 2010). This is in line with Tawonezvi (2006)'s argument that the marginal profit gained by farmers through storage may not be enough to offset the immediate need for cash. This in effect may lead to farmers forfeiting the use of warehouses as they consider the time value of money and opportunity cost of time. These opportunity costs forms the basis of non-financial costs. Financial costs include the cost of transporting the soyabeans to the warehouse and the cost the farmer will pay for the storage.

2.6 Factors affecting use of the WRS

Besides costs and benefits of the WRS specific preconditions need to be fulfilled in the use of the system and as such if they are not met the warehouse would not operate efficiently. These include the availability of storage facilities, a strong regulatory framework, and favourable demand for the crop. According to Baker and Warren (2006) the WRS works best if there is a supportive public policy which allows free market forces to operate thus promoting demand for the crop. This attracts the warehouse operators to venture into the business of soyabeans storage. The warehouse operators have to operate efficiently in terms of reliability and accessibility. Farmers and warehouse operators enjoy a symbiotic relationship as the warehouse becomes more efficient in its operation and as more farmers will be will-

ing to use the services of the warehouse. The final impact is that more farmers will be willing to use the services which in effect will result in the warehouses increasing in number expanding in volume and geographical impact.

2.6.1 Level of Government Intervention and Regulatory framework

Coulter and Onumah (2002) argue that, warehouse service providers in Africa do not come close to fulfilling the industry's development potential because they lack regulatory framework to operate the warehouses, However Onuma (2000) asserts that the level of government intervention should be limited to provision of a regulatory framework on how the warehouse should operate and as such management should be private sector driven. This is because commercial organisations are believed to be sustainable as they are usually cost effective. Therefore there is need to balance centralization and decentralization of power between government and private sector in program implementation (Dethier and Effenberger 2011). It is eminent that a concrete regulatory framework increases the efficiency of warehouse operation thus one would expect this to have a positive influence on farmers on the use of the system

2.6.2 Reliability and accessibility of the warehouse

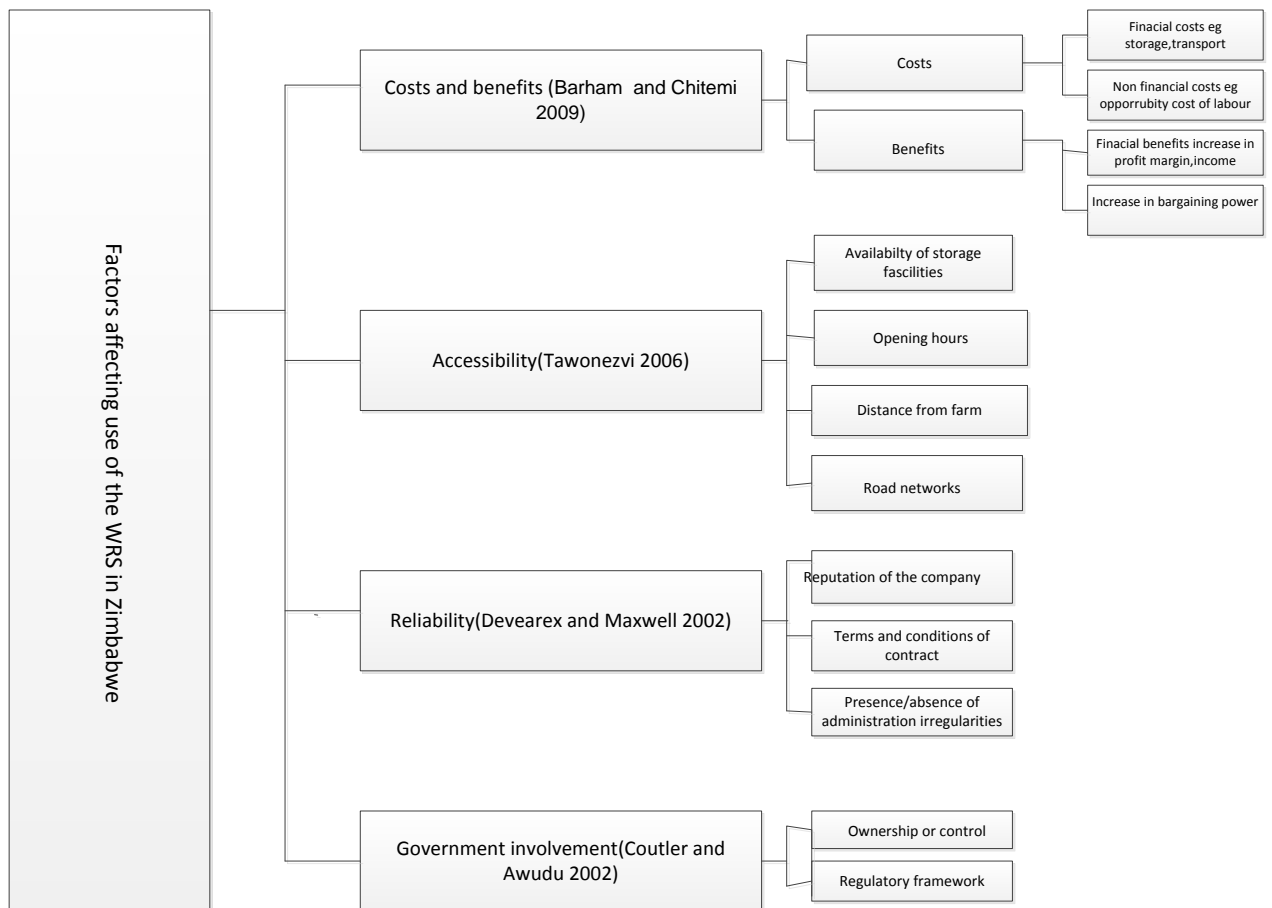
According to Beaurre d'Augères (2007) the WRS can only work if there is a highly reliable calibre of warehouse operators who have good business record and enjoy confidence of farmers and banks. The warehouse operators should also be compliant with regulations hence the need for a strong regulatory framework. There is a general need to increase farmers' role in crop storage. If more is stored locally in villages, rural people will be 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 stabilisation mechanisms (Barham and Chitemi, 2009). In Tanzania for example the warehouse project was partly successful because the grain storage was done in cooperative warehouses which were within a distance of 5 km close to the farmers. Although Coulter (2009) claims that bulking (formation of groups so as to store in bulk) is essential to small farmer participation in WRS other authors such as Turner (2012) argue that the efficiency of WRS lies more in the warehouse operators than the farmers as in reports in other similar projects in Malawi show that though farmers were organised in groups they had to use other marketing channels as the WRS was unreliable. This was reiterated by Schrader, (2012) that firm-farmer relationships are built on trust. Some farmers were alleged that their stocks were not properly recorded by the WRS. This is explained by Devereux and Maxwell (2001) as the presence of administrative irregularities which causes farmers to lose their trust in the system.

2.6.3 Demand and supply for the product

Whilst the availability for storage facilities is important for the establishment of the WRS however the demand for receipted soyabeans produce is of paramount importance as this ensures favourable selling prices for farmers. This may be a mixture of private and public sector demand, and it may be stimulated by exchange trading mechanisms. There is a 'chicken-and-egg' situation here because trading can be greatly assisted by the use of transferable electronic receipts instead of hard cash (Tawonezvi 2006). As already mentioned in Zimbabwe there is high demand for soyabeans since the country is a net importer of soyabeans (Zimstat, 2012). According to Gideon (2002) a relatively stable supply of produce from farmers is equally important for efficient operation of the WRS. In Zambia this was particularly evident after the poor 2002 harvest and in 2005 when the level of stock-

holding by ZACA-certified warehouses slumped to zero warehouse receipts and the warehouse operators ran a loss. In line with this one can argue that if the supply of the product is very low there is no need to use the WRS.

Figure 2 Conceptual framework of factors affecting use of WRS



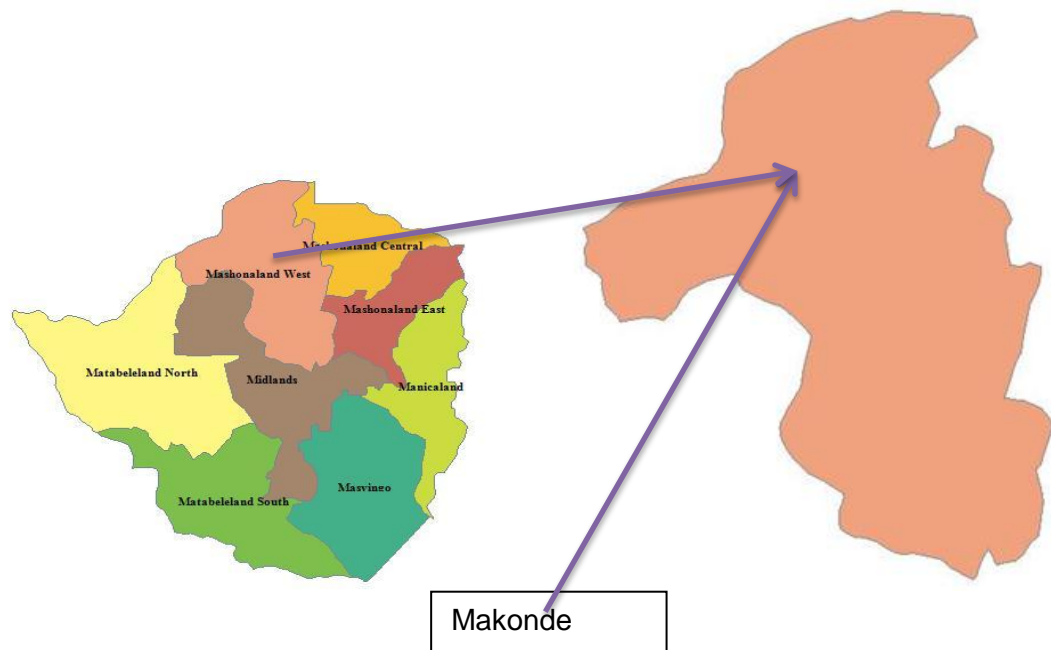
This framework is a compilation of all the factors as discussed in the literature review above by the author.

3 Methodology

3.1 Description of study area

3.1.1 Makonde district

Figure 3 The location of Makonde district



Source Ministry of Lands Zimbabwe 2004

The study was carried out in Mashonaland West province of Zimbabwe. The area is about 102 km North West of the capital city Harare (see figure 3 above). The area falls under Makonde district according to the classification from the Ministry of Lands and Resettlement (2004) and it is estimated that around 450 small scale farmers are present in this area with around 80 small-scale soyabeans farmers though the number fluctuates on yearly basis (Zimstat 2012). The area follows under the natural farming region 2 with average rainfall of around 1000mm per annum. The soils are good for most crops including maize, soyabeans and cotton. The area is composed of small scale farmers settled under the A1 model of resettlement of 2000 and other communal farmers (see annex1 for landholdings and resettlement models). The area was selected on the basis that natural constraints such as low rainfall and poor soils are eliminated. The area was also selected because that is the place where the WRS is used for one particular commodity (soyabeans) whose price is not controlled by government hence allowing the researcher to eliminate most of the macro factors which are beyond the scope of this study.

3.1.2 The warehouse

The warehouse operators use former GMB silos at Hunyani in Makonde district. Three silos are present at the site with a capacity of 5000 T each currently. In 2008 the STF contracted the Nutrichem private company in Hunyani to conduct warehousing operations for soyabeans farmers. The farmers pay for the storage costs to ensure that the project is sustainable in the long run as farmers are not depended on donor funding. The company is however also involved in other allied activities of input supply and agro dealing.

3.2 Research Design

The research is designed into two stages: the first stage involves desk study and the second stage is the collection of data on the field. The desk study part collected theoretical information, which is useful to understand concepts related to this study. Hence, secondary information was gathered by reading different literatures and documents related to the topic of research. The researcher also made use of other secondary data sources such as warehouse receipts, contracts and reports from the warehouses. Other sources of secondary data which were considered are crop reports from the ministry of agriculture to check the overview on production and marketing of soyabeans. The second stage involved gathering of primary information where a case study was used. Oliver (2008) stated that a case study approach is particularly appropriate for individual researchers because it gives an opportunity for one aspect of a problem to be studied in some depth within a limited time scale. This design is practical given that the research is targeting a specific project in Makonde district and the factors affecting the use of WRS in the area. Qualitative data was used. Upon arriving in Makonde district the researcher went and get permission from the local chief to interview the farmers in the area. The researcher also had to ask permission from the head office of Nutrichem to carry out her observations at the warehouse premises in Hunyani.

3.3 Sampling, data collection and analysis methods

3.3.1 Sampling method

According to Veschuren and Doorewaard (2010) it is eminent that when a case study is used the researcher would use strategic sampling instead of random sampling to avoid ending up with atypical sample as the sample size would be small. Using the purposive sampling method the researcher selected 16 soyabeans farmers for the purpose of the study. This sampling method is appropriate to identify a group of people with certain characteristic. In this research this was done to identify small scale soyabeans farmers. The sample consisted of the small scale farmers in Hunyani area where the WRS is in operation. The researcher selected the 8 warehouse users randomly from the list at the warehouse. The information from warehouse records on name and address of farmers helped the researcher in locating the selected farmers. For the non-users the researcher used records from the department of agricultural extension to locate small-scale soyabeans producers and cross check with the list from warehouse to find the 8 farmers to represent non-users of the warehousing facility. This selection was also done randomly. For the key informants, according to Ritzer (2007) key informant is a knowledgeable participant of a particular subject which is an important part of the investigation. In this regard one extension agent from AREX and 2 workers representing the warehouse operators were interviewed.

3.3.2 Data collection and analysis

The main data collection tool used was a checklist administered through interviews (see annex 1 for the checklist). Though the focus group discussions are a very important way of drawing information the researcher was not able to use them due to other factors which will be explained in the limitations of the study. Observations were thus another data collection method. After acquiring permission from the head office of Nutrichem the researcher spent 3 days visiting the premises of the warehouse operators. The observations helped to check information such as opening hours, procedures and activities done at the warehouse. Informal discussions at the warehouse with staff and farmers (who were not part of the sample size) also provided the researcher with some information on the reliability of the ware-

house. Other observable features such as road networks, information on billboards were noted to cross check with information from the respondents. The list of respondents and type of data collected is summarised in Table 2 below. Triangulation of information from farmers, key informants and secondary data was also done to improve the credibility of the data.

Table 2 List of data sources and type of data collected

Data sources	Accessibility (srq1)	Reliability (srq2)	Costs and benefits (srq3)	Regulations (srq4)
Farmer	<ul style="list-style-type: none"> Distance from farm to warehouse Road networks 	<ul style="list-style-type: none"> Terms and conditions of contract Adherence of the operators to terms and conditions 	<ul style="list-style-type: none"> Transport and storage cost Increased income benefits 	
Warehouse operator	<ul style="list-style-type: none"> Opening hours Availability of storage capacity 	<ul style="list-style-type: none"> Terms and conditions of contract 	<ul style="list-style-type: none"> Transport and storage cost. 	
Arex Official		<ul style="list-style-type: none"> Reputation of company 	Benefits of WRS-access to credit and increased income. Costs –opportunity cost of time.	Government policy on trade and soyabeans production.
Observations	<ul style="list-style-type: none"> Road networks Opening hours 	<ul style="list-style-type: none"> procedures 		
Warehouse records, contracts and receipts		<ul style="list-style-type: none"> Terms and conditions of contact 	Transport costs, storage costs, quantity of soyabeans stored	

After collecting data the researcher summarised the data from the checklists and analysed it. The qualitative data was presented in a descriptive form. For qualitative data analysis the research is analysed using a grounded theory. In this case the conceptual framework of factors affecting use of WRS designed in the literature review was used as the data analytical tool.

3.5 Limitations of the study

Although the research was carefully planned the researcher is aware of its limitations. The researcher relied on the common pool vehicle from the workplace thus the transport means were not adequate. The respondents selected therefore were within a radius of 30km instead of the 45km radius which covers the whole Makonde district. This distance ensured

that the researcher would return the vehicle to the office on time. This provided a problem in the reliability of answering questions such as accessibility of the warehouse to the farmers. The researcher tried to make up for this limitation by using other sources of information such as warehouse records to note how far other farmers outside the chosen locality travelled to the warehouse.

The researcher was not able to conduct the focus group discussions as planned as the farmers were busy with marketing of other crops such as maize thus compromising the results. Alternatively the researcher had to visit the warehouse more frequently and the informal discussions made with farmers at the warehouse gave more insights into the subject.

The methodology used relied mainly on self-reported data. According to Oliver (2009) such data contain several potential sources of bias such as selective memory (remembering or not remembering experiences or events that occurred at some point in the past) and telescoping (recalling events that occurred at one time as if they occurred at another time). The research therefore was also subject to the above biases. The researcher however tried to verify the statements from most of the respondents in order to triangulate and to minimise these biases.

Chapter 4 Findings

This chapter gives an overview of the findings and results. The topics follow the sequence of the key terms in the conceptual framework which formed the basis of most of the questions asked. These are Accessibility, Reliability, Costs and Benefits, Level of Government intervention. The findings are based on the information obtained from the small-scale farmers classified as WRS users and non-users and from the warehouse operators and key informants as already discussed in the methodology chapter. The findings are also based on the observations made by the researcher. In this chapter the terms users and non-users will be used to mean farmers who use the WRS and those who do not use the WRS respectively.

4.1 Background information

The researcher asked various questions concerning the farming operations and general household assets of the respondents. This subsection therefore presents the findings about the interviewees according to the following subheadings: household assets, crops grown by farmers in Hunyani and the acreage and total yield of the farmers.

4.1.1 Household Assets

Though the assets can be classified into five different categories of physical, human, financial, natural and social capital, the researcher will just briefly give an overview of all the assets of the interviewed farmers. This is summarised in tables 3 and 4 below.

Table 3 Household assets owned by non WRS users

Farmer	Assets Owned
1	Cart, wheel barrow, small farm implements , income (from sales of soyabeans, and maize)
2	Cart, small implements, wheelbarrow, cultivator, radio, bicycle
3	Cart, plough, cultivator, income (from sales of soyabeans, cotton and maize)
4	Income from sales of soyabeans, remittances from family abroad, plough, wheelbarrow
5	Wheel barrow, Income from sales soyabeans
6	Income from soyabeans, maize and cotton
7	Income from soyabeans sales
8	Income (from tobacco, maize and soyabeans sales),truck

The household assets possessed by most of the non-users include cart, ploughs and small implements. Only one non user owned a truck.

Table 4 Household Assets owned by warehouse users

Farmer	Assets owned
1	Cart, plough, small truck, income(from sales of soyabeans and maize)
2	Cart, plough, cultivator, income(from sales of soyabeans, maize and tobacco)
3	Radio, truck, cultivator, income from soyabeans and maize
4	Truck, cart, wheelbarrow, TV set, radio, solar system, income from soyabeans and maize sales
5	Cart, plough, cultivator, income (from sales of soyabeans, cotton and maize)
6	Truck, cart, wheel barrow, cultivator
7	Cart, plough, wheelbarrow, stocks of maize and soyabeans. cell phone
8	Truck, cart, wheelbarrow, income from sales of soyabeans , tobacco and maize

The household assets possessed by most of the WRS users are carts, ploughs and cultivators. Four of the users also had trucks.

4.1.2 Crops grown by farmers in the Makonde area

In Hunyani area, Makonde district where the research was carried out the main crops grown included soyabeans, and cotton as shown in table 4 below. Maize which is the staple crop for the country is grown by almost everyone in the area and all the farmers interviewed indicated that they grow the crop each and every year. Other minor crops included food crops such as groundnuts, sugar beans and peas but on a very small (less than an acre) for most of the farmers interviewed.

Table 5 Main crops grown by interviewed farmers in Makonde district

Crop	Number of farmers growing	
	WRS Users (n=8)	WRS Non Users (n=8)
Maize	8	8
Soyabeans	8	8
Cotton	4	2
Tobacco	2	3

4.1.3 Soyabeans yield and acreage

According to the respondents most of the farmers growing soyabeans in the area are not contracted by any company. Two non-users said that they once used the system but were no longer interested for reasons cited later in this chapter. Their yield ranged from 0.8 tonnes to 11 tonnes per year. Table 6 shows the soyabeans yield for the interviewed non users for the 2011-2012 growing season.

Table 6 Area cultivated and soyabeans yield for WRS non-users

Farmer	Acreage (ha)	Total yield (tonnes)
1	1	0.8
2	1	2
3	2	2.5
4	2	3
5	3	3.5
6	2.5	5
7	4	5.5
8	4.5	11

The yearly average yield for users interviewed ranged from 3 tonnes to 9 tonnes with most of them in the range of 3-6 tonnes. Five of the users had been using the warehouse ever since 2008 when the system was put in place. Two users had started in 2010 and the last one was just starting it this season after getting a hint from one of his neighbours.

Table 7 Area cultivated and yields for soyabeans by the WRS users

Farmer	Acreage (ha)	Total yield (tonnes)	Quantity stored in warehouse (tonnes)
1	2	3	3
2	2	3.5	2.5
3	2	4	4
4	4	5	3
5	3	5.5	3.5
6	2.5	6	6
7	4	7.5	5
8	4.5	9	7

4.2 Accessibility of the warehouse

Accessibility was defined as the ease with which a facility or location can be reached from other locations. Based on this definition the following subheadings were used to present the findings under accessibility of the warehouse: geographical distance and road networks,

opening hours and customer service and availability of enough storage space.

4.2.1 Geographical distance and road networks

Six of the 8 users of the WRS indicated that the warehouse was accessible in terms of geographical distance and road networks. The distance from the warehouse was ranging from 5 km to 28 km with 5 of the users living within 15 km distance from the warehouse. There are many gravel roads linking the farmers to the warehouse with one tarred road linking the warehouse to the nearest city Chinhoyi which is 50 km away. Only 2 of the non-users who lived about 23 km from the warehouse said that the gravel roads had potholes hence for small trucks it was difficult to reach the place. Six other non-users lived within a distance of less than 15 km and reiterated that the warehouse was accessible. The information from the AREX records however indicated that some other farmers lived as far as 40 km from the warehouse.

4.2.2 Opening hours and customer service

All the users indicated that the opening hours were from 8am-5pm every working day with a lunch break from 12.30-1.30 pm. This was also written on the billboard at the gate. Five out of eight warehouse users said the warehouse operators treated customers with respect and that they were hardworking. Two others said that at any place where a lot of people meet you would expect the workers to lose their temper at times and Nutrichem workers were not an exception. One of the farmers expressed his concern over the time taken by the warehouse operators during the process as he said that the same person who weighs the produce is the same person who will do the receipting, offloading of the truck and reweighing of the empty truck. He went on to say that at places such as Candour Ginneries where they sell their cotton the system was computerised and fast. The AREX official also confirmed that in other places where grain marketing was done such as Grain Marketing Board (GMB) the system was computerised. The long-time spent attending one customer was also evidenced by the long queues of trucks and carts loaded with soyabeans for farmers waiting to be served (See figure 2 below).

Figure 4 Queues of trucks by the warehouse gate



Of the 8 non users interviewed 4 of them had visited the warehouse though they used it to sell their produce instead of stocking. They would go to the warehouse and sell their soyabeans and receive their cash instantly. This was explained by the warehouse operator that the warehouse operators sometimes buy the soyabeans from farmers on behalf of accountholders (who might be other farmers or brokers) and stock it for them. One of the four farmers hardly knew that the place was also used for warehousing and he said “I have been coming to this place to sell my soyabeans and maize for the past two seasons but this warehousing thing you are only telling me now, we only hear about it from the radio”. The other four farmers hardly visited that warehouse as they had other selling points for their produce. All the four farmers who did not visit the place were also unfamiliar with the concept of WRS. When the AREX officer (one of the key informants) was asked about the knowledge of farmers concerning the concept he answered, “Though we did some sensitisation to farmers about the WRS it was not very effective and approximately 15% of the population accepted the concept over the three years.” The researcher also noted that at the gate, besides the name of the company, the billboard only indicated the opening hours and indemnity clause without any information about the services rendered by the company.

4.2.3 Availability of the storage space

The warehouse operators said the storage space was abundant as they explained that the three silos available had a capacity of 5 000T (five thousand tonnes) each yet when the researcher visited the place only one silo was filled to about half the capacity. For farmers (both users and non-users), they all thought the storage facilities were being underutilised as one farmer puts it “the farmers of today are still far away from emulating what was done by farmers during the 90s when you will find all the silos filled to the top after harvest.” The AREX official also explained that availability of storage space was not the problem but what to store since the farmers average yield had decreased from that during the 90s.

4.3 Reliability

To ascertain whether the WRS was reliable or not the researcher used the following subheadings: company history in allied activities, terms and conditions of the contract and administrative irregularities.

4.3.1 Company History in Allied Activities

The warehouse operators indicated that their company was contracted by STF which represents the local management unit of soyabeans projects in Zimbabwe to provide warehousing facilities to farmers since 2008. The company has been and is still involved in agricultural input supplies and agricultural commodity brokering. The company however rent GMB silos to keep their produce and they did not disclose the rental charges. All the farmers (WRS users and non-users) interviewed indicated at least that they knew the company as being involved in agro input supply. The company is legally registered as a private company. Currently the company stock soyabeans on behalf of farmers or brokers who are accountholders. They explained that when they buy soyabeans from farmers it would be on behalf of some account holders who would have left their cash, hence they buy and stock for them. Three of the users interviewed said that the company was not a “fly by night” referring to those companies who are opportunists. One other farmer said, “What I don’t understand is how the company is linked to GMB (the government parastatal who is involved in grain marketing) because it still uses the same silos and GMB also used to give farmers receipts.” However she went on to say that unlike GMB which gave receipts solely

because it did not have the cash to give to their farmers Nutrichem gave farmers the choice to stock or sell immediately. Three other farmers said they didn't look much into the history of the company since many new companies were now emerging in Zimbabwe and they were prepared to make risks now and again.

Though some of the non-users were not very sure about the operations of the company, 5 were at least aware of the name Nutrichem being involved in agriculture. Three of the farmers indicated that for them agro dealers were all the same so their non-use of the WRS had nothing to do with the history or reputation of the company. When asked about what he thought were the perceptions of farmers about their company the director replied "I am not running a charity here, I also have to make a profit at the end of the day so this new operation is also for profit making and farmers loose it when they think it is for charity". He went on to say that farmers usually do not sell to the reputable companies including Nutrichem because they are used to deal with local traders. Three farmers confirmed this as they indicated that they sometimes sell to the traders who come to their places.

4.3.2 Terms and conditions of the contract

Five users indicated that the contract was clear and straightforward. They explained that the contract allowed them to bring any quantity of soyabeans for storage from as little as 50kg to as high as a thousand tonne. The other 3 users noted concerns about the fact that there was too much paperwork involved. This was also reiterated by the Arex official that usually farmers are sceptical about signing a lot of documents that instead of reading the contract they usually consulted with them to explain the contract to them before signing. The director of the warehouse said the contract was clear to both parties but his manager expressed concerns that some of the jargon used was difficult for farmers and he emphasized that he noted it since he worked with farmers on a day to day basis. The contract is also written in English whilst the farmers' vernacular language is Shona hence the need to translate. Only two of the non-users had come across the contract and they said for them it was clear and easy to understand when translated. The contract was explained to them orally in the vernacular language. One other farmer indicated that he knew about the receipts only from GMB and he alleged that during that time the GMB did not have money hence they gave them the receipts but up to now the company did not pay for them. Therefore the farmer was no longer interested in anything which would make her wait for her money for a later date. The other four farmers did not see the contract but from the information they had from other farmers they thought the process was not difficult. They however did not know that Nutrichem was also doing the system as they thought it was just rumours.

4.3.3 Administrative Irregularities

Both users and non-users said the quantity they had stored or sold would always be correctly written, though one of the users explained that one should always give room for human error. The warehouse operators said they had highly experienced data capturers and though most of the processes were done manually the staffs was highly dependable. Though the operations are supposed to be governed by the agro dealers association of Zimbabwe according to the warehouse operators the representative association rarely pays visit to the premises. The rules and regulations in the policy of the agro dealers association however shows clearly that no party should benefit from dubious operations at the expense of the other party.

4.4 Costs and benefits

To answer the question on benefits and costs, the researcher had to distinguish first between costs and benefits. Thus subsection 4.4.1 presents the findings on benefits associated with the WRS and subsection 4.4.2 presents the costs. The costs and benefits are presented according to the various sub dimensions of costs given in the conceptual framework.

4.4.1 Benefits

The benefits are considered to be the gains obtained from using a certain service. In this case the following headings represented the findings on benefits: Increase in income, decrease in post-harvest losses, decrease in transactional costs and increased access to credit. These benefits were based on the benefits highlighted by Barham and Chitemi, 2009 as discussed in the literature review.

a. Increase in income

As already mentioned in the literature review (chapter 2) the term income for the purpose of this study is limited to the financial gain from a transaction. In this case the income is describing the money received from soyabeans sales. Four of the eight warehouse users claimed that the use of the WRS allowed them to get the highest possible income from soyabeans production. Box 1 below, for example, relates the story of Mr Tumbuyu one of the WRS users.

Box 1 Use of WRS in increasing income: Mr Tumbuyu's story

How WRS helped me buy my first truck

I am a newly resettled farmer with about 10 years' experience who has been using the WRS since 2008. I harvested my 6 tonnes of soyabeans in April 2009 and brought them to the warehouse by then the farm gate price for soyabeans was \$ 280/tonne. I waited for prices to increase and in February 2010 I informed the warehouse to sell my produce at the prevailing price which was US\$1000 /tonne. I couldn't imagine myself getting such a high amount of money which I used together with my savings to buy my very first 1 tonne truck, thanks to the WRS. My colleagues who had sold their crop in April 2009 only sold them at \$280/tonne.

This was also reiterated by the AREX official and warehouse operators that in the 2010-2011 marketing season the price ranges were as from US\$300 to US\$1200/tonne. The price changes for the 2010-2011 and 2011-2012 marketing season were estimated as in table 8 and 9 below by the warehouse operators. Currently (July 2012) the soyabeans were being sold at around US\$480 /tonne and all the 4 farmers who had affirmed that income increased from using WRS were optimistic that the prices would increase with time. The other 3 farmers explained that though there were fluctuations in prices during the course of the year what they wanted about the WRS was that you get your money and use it when you really need it. This is because these farmers usually opt to release their stock from the soyabeans in October and use the money to buy inputs for the next season rather than in April when they would misuse the money. These 3 farmers also said prices

sometimes did not increase but rather decrease though they did not have specific examples. 1 user said that this was all about gambling so one would always hope for the best.

Table 8 Trends in prices for soyabeans during the 2010-2011 marketing season.

Month	April 2010	May 2010	Jun 2010	July 2010	Aug 2010	Sept 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011
Average Price in US\$/tonne	300	340	400	520	560	720	850	900	930	980	1000

From table 8 it can be noted that the prices fluctuations were very high as the range was from \$280-\$1000 for the 2010-2011 marketing season when compared to the 2011-2012 season where the price range was from \$380 to \$680.

Table 9 Trends in prices for soyabeans during the 2011-2012 marketing season.

Month	April 2011	May 2011	June 2011	July 2011	Aug 2011	Sept 2011	Oct 2011	Nov 2011	Dc 2011	Jan 2011	Feb 2012
Average price in US\$/tonne	380	380	390	440	520	560	560	590	630	630	680

Nb: the 2011-2012 marketing season is the 2010-2011 growing season because the soyabeans is cultivated from October of the preceding year and sold from April the next year.

Four non users said they did not see any significant differences in prices during the season. Some other two farmers said although they knew the prices fluctuated they couldn't take the risk in the sense that for some seasons the prices sometimes will fall yet the warehouse would still need their storage fee. 2 of the other 4 farmers who acknowledged the fact that prices fluctuate during the season could not figure out how exactly the concept would help them reap maximum inputs. One female farmer who said she usually harvested around 0.8 tonnes of soyabeans per year and sold it to the local dealers could not hide her disappointment with the difference in prices and said "We are being short-changed here the dealers are buying the beans at US\$300/tonne yet in Harare it is going for US\$500/tonne but who would go to Harare for you". When asked why she wouldn't use the warehouse system to caution them from difference in prices, she explained that she wanted her money immediately and was not for the idea of keeping a receipt as money.

b. Decrease in post-harvest losses

The post-harvest losses indicated by the farmers who used WRS included loss from rodents, loss in weight of soyabeans due to poor storage conditions and human theft. One of the users indicated that in 2008 she had kept her 7t of soyabeans for 6 months under a homemade shed but when she sold it they were a tonne less thus she did not have the same income as she had anticipated. Following that, she now uses the WRS as the operators have good storage conditions. The non-user farmers also indicated post-harvest losses such as theft and general decrease of weight due to the scotching sun or rotting of the beans due to moisture. Six of the 8 farmers interviewed indicated that storing

soyabeans at home was too risky hence they had to sell immediately after harvest. Two of them acknowledged that the WRS offered good storage conditions but they would store their produce at home though it was not very safe but at least the produce was near to them anytime they could sell it not entrusting someone to do it for them. This was in line with the comments of the AREX official that farmers though most farmers were aware of loss of income from their soyabeans due to post harvest losses and of it few considered using the WRS.

c. Reduction in transactional costs

Both users and non-users said they did not see any difference in handling cost when dealing with Nutrichem because it performed both functions of selling or stocking. One WRS user explained that the transactional costs were reduced as he did not have to run around to compare the prices but the warehouse will do it on his behalf. For this user the WRS solved the problem of difference in scales used by different buyers was as he would bring his soyabeans to the warehouse and a standard scale was used.

d. Access to credit

Only 1 of all the eight farmers was interested in getting credit from the banks and he also acknowledged that the WR also saved as collateral security when borrowing. The other 7 farmers indicated that they did not use credit because the interest rates were high. One of the farmers said “If you start this credit thing at the end of the day you become a slave of the bank”. This was also confirmed by the AREX official as he said that the current bank interest rate was 23% and he regarded it as too high for farmers. The Warehouse operators also indicated that the WR could also be used to purchase some inputs during the preparatory season and for them that was not credit because one would be using his/her money so it was more like a cheque. He echoed this with the following sentiments, “For us the stocks of soyabeans are already money .We see dollars not these white small grains in stock.” Of the 8 farmers 2 were doing contract farming with a local company and the rest were not interested in farming credit at such a high interest rate. They reiterated that farming was becoming expensive and for them since the banks were the ones setting the interest rate having a WR would not help much.

4.4.2 Costs associated with the WRS

In business, cost is usually a monetary valuation of effort, material, resources, time and utilities consumed, risks incurred, and opportunity forgone in production and delivery of a good or service (Myers, 2004). In line with this definition the costs were presented under the following headings: transport cost, storage costs and opportunity costs.

a. Transport costs

Both non users and users interviewed implied that since the warehouse was doing both stocking and buying the transport costs were the same since they would have to deliver their produce from home to the selling or stocking point. One of the non-users who sold to local dealers implied that high transport costs were the main reason why she did not sell in

town though she knew about the high price difference. She went on to say that transporting a 50 kg bag over a distance of 13 km to the warehouse would cost her around \$10. Of the 8 users interviewed 5 of them had their own means of transport whilst the other two had to hire from other farmers. Of the on-users interviewed 2 had own transport and one of them who had a big truck explained that he also used it to ferry other farmers produce for a fee. He went on to say that transport was very costly if one didn't have his/her own truck. When further asked how he managed to buy the truck from farming he replied that he also grew tobacco as a cash crop besides soyabeans so he got income from different crops. This was also reiterated by the warehouse manager as he said that they didn't go to the farms rather they expected farmers to bring their produce due to high transport costs. One other non-user who lived less than 8 km from the warehouse also said it was cheaper to ferry his tonne of soyabeans by cart though it was laborious and time consuming as he explained at times he would wake up at 3 am to bring his produce to the warehouse by an ox driven cart.

b. Storage costs

The users said that storage costs were around \$30/month per tonne and this was also confirmed by the warehouse operators. About 5 farmers voiced their concern that the storage was expensive considering that sometimes the farmers would only have a profit of \$20 after storing produce for 10 months. The warehouse operators had a price chart showing the different storage prices per quantity of soyabeans and currently the cost was \$30/tonne. There was no indication of a fixed cost however for larger quantities of 10 tonnes and above the storage cost were reduced to about \$25/tonne. The cost of storage will be discussed further in the analysis chapter as a cost benefit analysis of storage will be done. These were the sentiments said by one of the non-users who sells her soyabeans to the local traders "The soyabeans do not feed, the warehouse operators just keep them and add no value to the crop yet you will be obliged to pay them a lot of cash". She considered the storage costs as very expensive. Other 3 non users also echoed similar sentiments.

c. Opportunity cost

Six of the eight user farmers said they did not stock all of their produce. Mrs Mangena said that she harvested 5 tonnes of soyabeans last year and stored 3 tonnes and sold 2 tonnes immediately harvesting so as to cover the immediate cost of production and pay for labour. Mr Mundondo also stocked half of his produce and he said he did this so as to spread the risk because at times the price changes won't be very much. The other two farmers said that they acknowledged that farming was a risky business just like the risk they took to cultivate soyabeans on more than $\frac{3}{4}$ of their total arable land; they stored all their produce though the opportunity cost was high. They could not have their money immediately for use but it helped them save the money because as Mr Mangena puts it "you cannot go to the beer hall with a receipt for no one would accept that form of money there." This was to explain that the WRS helped them to save their money since one would not receive all the cash soon after harvesting. "The headache of keeping your produce unsold and only wishing the ancestors will see you and get a high price is just too much, it's better for me to

sell at \$400/t than have a headache and get \$40 extra after 3 months”, this was what Mrs Marakwa had to answer when asked about the opportunity cost of selling the produce rather than keeping it. Mrs Marakwa has never used the WRS and indicated that she was not even considering using it in the near future. These same sentiments were echoed by the majority of the non-users interviewed. The warehouse operators also reiterated that the farmers were afraid that at times prices will soar and they would rather have their money immediately. This was also evidenced by the quick negative responses that some of the farmers gave who came to sell their soyabeans at the warehouse when they were asked at the gate whether they wanted to stock.

4.5 Government intervention

According to the AREX official this programme was supported by the government. The AREX department a governmental organisation under the Ministry of Agriculture was involved in disseminating information to farmers. The sensitisation about the WRS project done by the department as also explained in subsection 4.1.2 was constrained by lack of resources such as transport and personnel making the campaigns less effective. “The government usually support the small-scale farmers by provision of agro inputs and extension services said the AREX official.” For the WRS project the government support was limited to just information dissemination. The company operating the warehouse (Nutrichem) is a privately owned company and soyabeans being an uncontrolled commodity the prices are usually set by the market forces said the warehouse operators. The agricultural policy in Zimbabwe does not allow GM soyabeans to be imported in the country. As such there is a high demand for the crop in the country which cannot be met by large scale farmers only. In line with these local small-scale farmers therefore are encouraged to grow more soyabeans since they do not face competition from imports.

4.6 Summary of Results

Most of the WRS users have a broader asset base including trucks. They also have higher yields as compared to the non-users. Though the users and non-users had similar opinions for some aspects such as accessibility and reliability of the company, other factors made them to choose whether to use the WRS. The views of users and non-users were different in aspects such as opportunity cost of storage and income from using the WRS. The costs and benefits of the WRS formed the basis of most of the arguments by the farmers. These findings will be used in the following discussion to better understand the factors limiting or facilitating the farmers to use the WRS.

Chapter 5 Discussion

This chapter presents an analysis of the factors which are facilitating or hindering small scale farmers in Makonde district to use the WRS in order to maximise income from soyabeans. The discussion is based on the results from the previous chapter and the conceptual framework already discussed in the literature review. The headings therefore follow the same sequence of Accessibility, Reliability, Costs and Benefits and Level of government intervention.

5.1 Accessibility of the warehouse by farmers

In order to answer the question on how accessible is the warehouse to farmers, the researcher used the findings from the results chapter together with literature to analyse the factor. The road networks and geographical distance were analysed in chapter 5.1.1 whereas 5.1.2 presents an analysis of the customer service and availability of storage space in relation to the use of the WRS.

5.1.1 Road networks and geographical distance

In an analysis of projects connecting small-scale farmers to formal markets, Seville et al (2011) in Turner (2012 pg 7) concluded that different products have different potential for benefitting poor farmers through linkages to formal markets, and that farmers with higher levels of assets (including access to road and motorized transport) are more likely to benefit from participation in formal markets. In line with this the findings indicate that most WRS users also have their own trucks. This made it easier for them to carry their produce to the markets. Non users closer to the warehouse also could use other means of transport such as carts even when bringing their produce for sell. According to Barham and Chitemi, (2009) if warehousing facilities are offered in the local communities the farmers are likely to participate in commodity markets more than if they are beyond reach. In Tanzania for example the WRS project was successful because the warehouses were within a distance of 20km from the farmers (Coulter, 2009). This is in line with what the Nutrichem manager referred to as bringing the service to the people. Though the warehouse is located in the rural areas where the farmers are, the results show that the lack of own transport maybe a factor limiting for some soyabeans farmers to use the WRS. This is indicated by the results in the table as 4 of the WRS users own trucks but only one non user had a truck in table 3.

5.1.2 Customer service and availability of storage space

Different sources of data confirm that the opening hours were from 8am to 5pm and these are considered to be the normal business hours in Zimbabwe. The interviewees indicate that the customer service was fine but evidence implied that farmers at times have to endure long queues for them to be attended. This discrepancy can be attributed to the fact that customer service can be a relative term depending on how one perceives it. Tawonezwi (2006) asserts that the WRS works best when there is availability of storage space in the warehouse. Considering that the storage silos at Nutrichem in Makonde are filled to less than a quarter of capacity the storage space is abundantly available and it is thus greatly underutilised. In a similar project in Zambia the warehouse operators at one time ran a loss when the stock of WR slumped to zero due to poor harvest (Gideon 2002). This implies that low level of stock can also negatively impact on the profit of warehouse operators thus limiting the use of the system. It should be noted therefore that whilst the availability of

enough storage space is a factor supporting in the use WRS very low stocks of soyabeans can have a negative effect on costs for the operators.

5.2 Reliability

As already mentioned in the literature review that farmer –firm relationships are built on trust, the reliability of the warehouse operators can affect the farmers in their choice to use the WRS or not. Basing on the findings on reliability the researcher used the following subheadings to discuss the reliability of the WRS to the farmers: Company history in allied activities, terms and conditions of the contract and administrative irregularities.

5.2.1 Company history in allied activities

The fact that farmers regarded the company not as an opportunist implies that both the WRS users and non-users regard it as a reputable company. This is important in building of trust between firms and farmers which is needed for proper business. From the information said by some non-users, it can be deduced that sometimes the experiences of farmers with other companies in the same industry can negatively affect the new company.

5.2.2 Terms and conditions of the contract

Though there were different opinions from both the users and on users of the system, non-users seldom indicated that the terms and conditions of the contract was a limiting factor in the project. The causes in variations could have been a result of perceptions and what one considers to be difficult can be considered easy by the next person. The limiting factor might be that since the contract is written in English the warehouse staff has to take time to translate and explain verbally to the farmers. This takes lots of time and makes the system less accessible to non-readers and/or non-English speakers.

5.2.3 Administrative irregularities

According to Devereux and Maxwell (2001) sometimes farmers lose their trust in public storage facilities due to some administrative irregularities for example when the amount of produce supplied by the farmer does not tally with what is written in the warehouse records. Though most of the farmers (both non users and users) alleged that there were no such things as irregularities, the sentiments of the other 2 users implies that despite the fact that sometimes there can be irregularities (referred to as human error by farmers) the farmers still trust the warehouse staff. In line with this, the absence of administrative irregularities is a strong link towards building of trust of the company by the farmers. Since most of the farmers regarded the warehouse operators as highly reliable, it can be deduced that this is one of the factors facilitating the use of WRS by small-scale farmers. Since non-users also claimed that the warehouse operators were reliable it seems that other factors other than reliability may be affecting their choice in the use of the system.

5.3 Costs and benefits

5.3.1 Benefits

a. Increased income

It should be noted that from the sentiments passed by both groups of farmers (users and non-users) there is an indication that the WRS enables farmers to get maximum possible income from the soyabeans. Farmers acknowledged that prices were different if one sells

soon harvest or later with the former gaining less income than the latter. This is in line with reports from the ZACA system in Zambia where a similar project was associated with benefits such as increase in income according to Gideon, (2002). Though some farmers could not ascertain that the WRS had a positive result in income, the system however allows farmers to stock and sell later thus allowing farmers to get maximum possible income from the soyabeans. The increase in income however should be enough to offset all the costs involved in storage. Taking for instance the farmer who claimed that he bought his truck after selling 6 tonnes of soyabeans at \$1000/tonne, It can be noted that although the price difference were large the increased income was not enough to purchase the truck but apparently it at least helped him to gain extra income. Though some users did not explicitly say that the WRS inevitably resulted in increased in income they acknowledged that most of the time the WRS allowed them to have a steady supply of income. This is because one can release his stock at different times of the year as shown in the results chapter.

a. Decrease in post-harvest losses

One of the objectives of the STF in Zimbabwe was to help farmers to store their produce as a way of minimising post-harvest losses and improving marketing of the crop (Tawonezwi, 2006). In line with this the farmers indicated that there was a considerable decrease in post-harvest losses due to the use of WRS. Though some non-users implied that the WRS was not the panacea for their storage losses and as such they opted for selling soon after harvest, it is evident from the results that storage at home is susceptible to losses such as theft and rodents infestations. The farmer who claimed that she had used the home storage and lost a tonne due to the poor storage conditions is a good example here. This is in line with Samuel et al (2000) who found in his studies that in most part of Africa post-harvest losses due to poor storage could account for more than 40%.

b. Reduction in transactional costs

Onumah and Coulter (2002) say that in the rural trade, transaction costs are high because of the uncertainty attributes of goods being exchanged due to the absence of standard scales. This is because the transactional costs are incurred when a farmer runs around trying to find the best buyer for his crop. The WRS is considered to be one of the solutions to this as standard grades and scales are used and also because farmers just bring their crop but the warehouse operators will look for the buyers (Gideon 2002). Despite this claim the decrease in transactional costs was not considered significant by WRS users if they compared themselves with non-users who came to sell at the warehouse. This can be attributed to the fact that since the company operating the warehousing is also doing the purchasing of the soyabeans the farmers may not be able to distinguish the costs clearly. For non-users who sold to other local traders they ascertained that the grading and scaling system was different depending on the buyer thus for them they incurred high transactional costs. All in all the benefit of a decrease in transactional costs was not being realised by many thus limiting farmers from using the system.

c. Increased access to credit

The results show that most of farmers (both users and non-users) did not need loans due to the high interest rate. Though there was only one farmer who acknowledged that the WRS helped in accessing credit as the WR could save as collateral security. The fact that WRS is

beneficial in that sense cannot be denied. The unanswered question however remains: Do farmers really need the farming loans from the banks at such rates of 23%? In this regard the benefit of access to credit is not applicable to most of the WRS users because the interest rate is already discouraging them from accessing credit. Gideon (2002) alleged that the WRS would enable banks to track their farming history thus building their trust with them. This however is not applicable to farmers in Makonde since they do not use the facility to access credit.

5.3.2 Costs of using the WRS

a. Transport costs

It was noted that transport costs were not very different for users and non-users who sold the soyabeans at the warehouse. This may be attributed to the fact that the warehouse was performing both functions of storage and purchasing soyabeans thus one way or the other farmers need transport to ferry their produce to the market. The results also indicate that transport was one of the expensive variable cost to the extent that some farmers would sell their produce to the local traders at their farm even when they knew that prices were a lot higher in other locations. Farmers with their own means of transport were in a better position to sell or stock at the warehouse than those without their own transport.

b. Storage costs

The discrepancies in the results shows that most non users considered the storage costs as rather expensive to the extent that one farmer thought there was no real value for money for the service rendered by the warehouse operators as she was quoted saying that the warehouse operators did nothing to add value yet they needed their money at the end of the season. Considering the fact that the storage cost is around \$30/tonne per month the storage costs can only be considered as expensive or cheap when one compares with the extra income gained when the soyabeans is sold. As such the table 10 below shows the cost benefit analysis of storage costs in relation to the extra income received from performing the marketing function of storage.

Table 10 Profit and loss from storing soyabeans at a cost of \$30 tonne/month

Month	Average price	Change in price(current less last month price)	Storage cost	Profit/Loss(change in price –storage costs)
April 2011	380	-	-	-
May 2011	380	0	30	-30
June 2011	390	10	30	-20
July 2011	440	50	30	20
Aug 2011	520	80	30	50
Sept 2011	560	40	30	10
Oct 2011	560	0	30	-30
Nov 2011	590	30	30	0
Dec	630	40	30	10
Jan 2012	630	0	30	30
Feb 2012	680	50	30	20

The monthly storage cost from the table is \$30. The profit or loss for a particular month is found by subtracting the storage cost from the change in price of the soyabeans. This is because the extra income from storage can be regarded as profit or loss after subtracting the storage cost. The negative sign for entries in the column of profit/loss indicate losses. For example if a farmer sold his soyabeans in November for \$590 as compared to \$560 in October the extra income he got is \$30 however after removing the storage cost of \$30 he got no profit. This shows that though there was extra income received there was no profit thus selling in November or October for him was not different. Tawonezwi (2006) said that farmers are likely to consider using the off farm storage options if the benefits will offset the costs. In line with this the profit margin from using the WRS is not all that high taking into account that there are still other costs besides storage.

c. Opportunity cost

The results from the non-users indicate that most of them do not stock their soyabeans due to the high opportunity cost of storage. This need not to be emphasized as farmers clearly indicated that they cannot stand the idea of leaving their produce unsold only hoping the price will get better as quoted from one of the non-users (see chapter 4.3.2). Even the users acknowledged that there was a high opportunity cost of storage; this can be expected considering that if farmers get their income immediately they will use it before the inflation rate catches up with them. Furthermore farmers would need the money to pay for the costs incurred during the season and this can be seen from the fact that even most of the WRS users did not stock all their soyabeans. Farmers choose whether to store based on how they view their opportunity costs if one views the benefits forfeited by storing as being high he/she wouldn't store and if one considers them to be low he would stock. Farmers are so much aware of the opportunity cost of storage as can be realised from the results that more than half of the interviewed users indicated that they would not store all their soyabeans they would rather sell some of it immediately. Although Coulter and Onumah (2002) had solid examples of cases in Tanzania and Zambia where the WRS had worked and farmers considered the opportunity costs to be lower, the results from the Hunyani case illustrates that many farmers do not consider the opportunity cost as low. As such farmers in Makonde are likely not to stock their soyabeans and this is explained by Barham and Chitemi (2009) that whenever farmers perceive the opportunity cost of storage to be high they would not go for the option. The speculation in prices in Zimbabwe can be one of the major factors which make the opportunity cost high as farmers are not able to follow the trends in prices of soyabeans. One example is of the 2010-2011 season the highest price for soyabeans was \$1000 yet in 2011-2012 it was a mere \$680

Summary of costs of using the WRS

As farmers are rational in their decision making process it is eminent that whenever they perceive the costs of a service to be higher than the benefits they are not likely to use the service. The perceived high storage cost, high opportunity cost and transport cost in the use of the WRS therefore are limiting the farmers' use of the WRS. It should be noted that for those farmers with less than 2 tonnes with no means of transport they will hardly use the WRS as an option since they consider the cost to be high.

5.4 Government intervention

According to Barham and Chitemi, (2009) the government should only intervene by offering a regulatory framework which allows farmers to participate in agricultural markets. In contrast to this though the project was managed by STF a Non-Governmental the limited involvement of the government could be one of the reasons the small-scale farmers could not use the WRS efficiently. This is because usually small-scale farmers need some financial assistance for them to participate in more formal markets as compared to the large scale farmers. Organisation local in line with this the intervention of the government in promoting the WRS is a positive contribution towards the project. The government's anti GMO policy also protects the local farmers from fluctuations in prices due to influx of imports. The policy environment thus enables the use of the WRS to improve farmers' income. The results from both users and non-users however imply that the government intervention is limited to supporting the WRS due to lack of resources. The policy on anti-Genetically Modified Organisms (GMOs) promotes the production of soyabeans by local farmers.

5.6 Summary of Discussion.

The findings show that most farmers consider the following factors to be affecting their decision making on whether or not to use the WRS. These factors include the relative accessibility of the warehouse to the farmers, the benefits derived from using the WRS, the costs of using the system and the reliability of the company. Table 4 below gives a summary of the factors hindering or facilitating farmers to use the WRS as a way of improving marketing of soyabeans.

Table 11 Summary of factors affecting farmers in use of the WRS

Factors supporting farmers to use the WRS	Factors hindering farmers from using the WRS
Accessibility: The presence of good road networks. The availability of enough storage space. Good customer service.	Lack of transport means by farmers.
Reliability: The absence of administrative irregularities. The clear terms and conditions of the contract.	Farmers have limited knowledge about the company's activities. Farmers have a bad image of companies using the WRS due to past experiences with other companies in the same business Contract difficult to read and/or understand for some.
Benefits: Increased income. Decrease in post-harvest losses.	The unrealised benefit of accessibility to credit. The unrealised benefit of decrease in transactional costs.
Costs	Perceived high storage costs. High opportunity costs. High transport costs due to lack of proper transport means.

Government Intervention: Government anti GMO policy promoting local production of soyabeans.	Lack of proper regulatory framework governing the warehouse operators. Government involvement in dissemination of information through the AREX department is rather limited.
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From table 11 above it can be noted that the farmers perceive most of the costs associated with the use of WRS as high. As farmers are rational in their decision making process it is eminent that whenever they perceive the costs of a service to be higher than the benefits they are not likely to use the service. The perceived high storage cost, high opportunity cost and transport cost in the use of the WRS therefore are limiting the farmers' use of the WRS. This is in line with Rusike et al (2000) who write that the option of storage may not be able to caution the poor farmers from all the marketing risks rather the farmers with high yield tend to go for the option as they can split their produce. Thus farmers with high yield will be able to reduce the opportunity cost of storage by stocking part of their produce and selling some immediately after harvest. The benefits of storing such as high income and decrease in post-harvest losses from soyabeans support the use of the WRS. Other facilitating factors in the use of the WRS are the availability of enough storage space and good road networks. This is important for farmers as they can easily access the warehouse and also promotes the increased production of soyabeans as farmers will have a ready storage place. The summary of the factors therefore forms the basis of the conclusion which will be drawn in the next chapter.

Chapter 6 Conclusion and Recommendations

This chapter presents the conclusion and recommendations based on the findings and discussion chapter. The objective of the study was to identify various factors affecting the use of the WRS by the small-scale soyabeans farmers thus providing an answer to the research question. This provides a basis for recommendations and suggests areas for further study.

6.1 Conclusion

Though various factors affect the farmers in their choice to use the WRS, the following factors were identified in this study. The supporting factors included the relative accessibility of the warehouse, the reliability of the warehouse and the benefits associated with the use of the WRS.

The warehouse was considered to be accessible in terms of road networks and availability of storage space. The other supporting factor was the reliability of the warehouse operators which forms an important factor in building the trust of farmers with warehouse operators. The high income and decrease in post-harvest losses were the major benefits associated with the use of the WRS by farmers. Therefore the recognition of these benefits was the main factor facilitating the use of the WRS by small-scale farmers. The government role was recognised as that of supporting the use of WRS through information dissemination and providing a suitable policy environment for the operation of the system. However the question on government intervention was too broad to be answered completely in this study.

The cost of using the WRS was the main factor limiting small-scale farmers to use the WRS. Farmers regarded the costs as high as compared to the overall benefits of the project. The costs include high opportunity cost, high transport cost and high storage cost. The inaccessibility of credit due to other factors beyond the context of this research limits the use of the WRS as farmers would not realise this benefit from using the system. This forfeits the whole objective of the project of increasing the maximum income for the small-scale farmers. The limiting factor on accessibility was that very few farmers had their own means of transport so for them the WRS was relatively inaccessible. This inaccessibility and high transport costs was highly recognised in farmers who had narrow asset base and lacked the means of transport.

In conclusion, generally the WRS be is not benefiting the bulk of small-scale farmers who have limited assets and low yields and who are the people considered to be low income earners in the country due to mentioned factors. In other countries such as Zambia, Tanzania and Malawi where the system was successful factors such as accessibility and access to credit were crucial in facilitating the use of WRs thus the small-scale farmers benefited .This was not possible in Zimbabwe where the rapid price fluctuations and inaccessibility of credit limits the farmers in using the WRS. This might be the reason why the WRS is not being used widely in Zimbabwe.

6.2 Recommendations

Based on the above conclusion the following recommendations are made by the researcher so as to try and reduce the impact of factors limiting the use of the WRS for small-scale soyabeans producers. The researcher also recommends areas for further study so as to solve new problems of lack of adequate information in some related studies.

- In order to improve the accessibility of the warehouse to farmers the STF might enhance communication between farmers and warehouse operators (Nutrichem). Nutrichem may provide transport services to those farmers without trucks for an agreed fee to ease the problem of transport.
- The high transaction costs exacerbated by the dispersion of rural populations and poor communications infrastructure can be reduced through formation of farmer groups. The formation of groups had been an important factor in reducing transactional costs in small holder farmer credit therefore it is most likely that if farmers form groups when using the WRS their transactional costs can be reduced. The role of the STF in this action is to facilitate group formation. Group formation will also go a long way in reducing the storage cost as seen in a similar project in Tanzania (Coulter, 2009) that farmers who were in organised in groups also stored their produce in bulk and will have a greater bargaining power on the price of the product.
- Other than formal groups, farmers can also be encouraged to join hands for example between three neighbours, and thus benefit from lower transactional costs/economies of scale.
- The STF should improve the communication facilities for farmers for example by providing means of transport to the AREX personnel who are responsible for disseminating information. This helps farmers to understand better the concept of the WRS.
- Though the warehouse was considered as relatively reliable there is need to improve the awareness of farmers about the system as this helps in building trust between both parties.
- For as long as the cost of borrowing remains high for the farmers, the farmers will never enjoy the benefit of access to credit when they use the WRS. In this regard other forms of linking credit to farmers such as contract farmers should be considered. The role of STF will be to promote dialogue between the farmers and companies in the industry.
- The researcher further recommends studies on the role of the government intervention in the WRS in improving the marketing and income of small scale farmers. This will be done to answer the question of how the government should intervene in the WRS to make it more relevant to the poor farmers.

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Annex 1: Checklist for farmers

1 Farmer characteristics

Age (farming experience).....Household assets owned.....

Geographical location.....

Average yield of soyabeans/year.....

User of WRS/non user (how long, since when).....

2 Factors affecting use of the WRS

Factors	Experiences/examples Views and comments	Relative importance	
Accessibility: Geographical distance, road networks to the warehouse, opening hours, customer service, availability of enough storage space			
Reliability: Terms and conditions of contract, administrative irregularities, Reputation of company			
Costs and benefits Benefits : decrease in post-harvest losses, high income, low transactional cost, improved access to credit Costs: transport costs Storage costs opportunity cost of time used in activities involved in using the WRS labour cost			

**Additional
information**.....
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Annex 2: Checklist for key informants

1 background information

Name of company.....

Type of company (private/public).....

Reputation of company.....

Geographical location.....

Factors affecting efficient operation of warehouse

factors	Experiences, examples, views and comments	Importance
Accessibility Geographical distance, road networks to the warehouse, opening hours, customer service, availability of enough storage space		
Reliability Company history in allied activities, terms and conditions of contract, regulatory framework.		
Costs and benefits Benefits decrease in post-harvest losses, high income, low transactional cost, improved access to credit Costs transport costs Storage costs opportunity cost of time used in activities involved in using the WRS labour cost		
Level of government intervention Pricing policy and demand conditions, regulatory framework		

Annex 3 Interview transcripts for some respondents.

Key informant 1 Mr Makwena AREX official

My name is Leonard Makwena and I am the district agricultural extension officer of Makonde district. I am involved in disseminating information to farmers and new innovations. The WRS system was first introduced in 2004 in Makonde district following the failure of the GMB to pay farmers in time. The farmers would deliver their grain crops including soyabeans to GMB and the GMB would buy them using the government gazetted price however it would take at least four months for farmers to receive their money from the company. For soyabeans there would be price fluctuations during the season because of difference in demand for the crop. So in 2004 farmers no longer wanted to sell their crop to the GMB. As AREX officers we lobbied for the WRS system and with the coming of the project through NRI, We were involved in informing farmers how the system works and the benefits of using it. I cannot say the lobbying was very successful but as you know in the adoption process we have early and late adopters. Very few farmers adopted the system of which about 70% were large scale farmers. The prices ranges for storage are reasonable compared to the benefits they will get. On fluctuations of prices what I can say is that farmers are far from getting their maximum potential income from the crop. Otherwise soyabeans is a promising crop for most small-scale farmers as it is easy to cultivate.

Mr Tumbuyu a warehouse user

My name is Tumbuyu Fredrick and I started farming in Makonde district in 2002 following the resettlement programme of 2000. For years I have been growing maize only and harvested around 15 tonnes until the GMB could not pay us in time. That company still owe me some money and I still have their receipts. Of course I could have used the receipts to get some inputs but the company they recommend us to buy inputs from are relatively expensive. I started growing soyabeans in 2006 but have been selling to other local traders such as surface investment in Chinhoyi. The good thing about soyabeans is that it has a ready market. I started using the WRS in 2008 after receiving a hint from my neighbour that soyabeans had turned to be gold. The prices are always fluctuating but one has to be clever. For example I harvested my 6 tonnes of soyabeans in April 2009 and brought them to the warehouse by then the farm gate price for soyabeans was \$ 280/tonne. I waited for prices to increase and in February 2010 I informed the warehouse to sell my produce at the prevailing price which was US\$1000 tonne. I couldn't imagine myself getting such a high amount of money which I used to buy my very first truck thanks to the WRS. My colleagues who had sold their crop in April 2009 only sold them at \$280/tonne. There are also a lot of risks in the WRS for example the prices can sour but we always hope for the best. Theft and fire risks during the storage are covered by the warehouse as stipulated in the contract as this is a big company. The WRS system really works if you have at least three tonnes to store because that's one can feel the profit margins.

Mrs Marakwa a non-user of the WRS

My name is Mrs Marakwa. I stay with my family here in the communal area of Maparo. I have been growing cotton ever since we got married. When my husband died we realised that cotton was too laborious and that was 2005 and we tried soyabeans from that year. Soyabeans is one of the highly paying crops –one can never go wrong with soyabeans. The crop has high demand and readily available markets for example you can sell at Nutrichem, GMB or in town. There are some people who come to purchase soyabeans from your doorstep. Of course I sell my produce immediately after harvest because I do not have proper storage conditions. Besides that, the headache of keeping your produce unsold and only wishing the ancestors will see you and get a high price is just too much, it's better for me to sell at \$400/t than have a headache and get \$40 extra after 3 months. I will continue to grow the soyabeans maybe when I will be harvesting large quantities that are when I will consider the WRS. On access to credit it is not possible to borrow money to use for farming because of the high interest rate of borrowing prevailing in Zimbabwe. Furthermore the system worked best when we had the Zimbabwean dollars but now with the advent of the US\$ cash is readily available.

Annex 4 land holdings in Zimbabwe

Type of farm	Total arable land
Estates and plantations	>60ha
Large scale commercial(A2)	40-60ha
Small-scale communal	2-10ha
Small-scale resettlements(old model)	4-15ha
Small scale (A1 resettlements)	6ha

Source: Ministry of lands Zimbabwe 2012

Annex 5 Photos taken during data collection



The researcher chats with one of the WRS users and his son.



A soyabeans farmer and her household chats with the research as they continue with their maize shelling business.



Farmers wait to be served at the gate of the warehouse.