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# SAHEL RESILIENCE LEARNING PROJECT (SAREL)

## Opportunities and challenges for warrantage in the Sahel: A literature review

September, 2016

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# **SAHEL RESILIENCE LEARNING PROJECT (SAREL)**

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## **DISCLAIMER**

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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## Acronyms

ACDI/VOCA	Name of the organization that resulted from merging Agricultural Cooperative Development International and Volunteers in Overseas Cooperative Assistance
CB	Cereal bank
CBPR	Community-based participatory research
EAGC	East African Grain Council
FAO	Food and Agriculture Organization of the United Nations
ICP	Inventory credit program
IFC	International Finance Corporation
IFI	International finance institution
IFPRI	International Food Policy Research Institute
IGA	Income-generating activity
IMF	International Monetary Fund
MFI	Microfinance institution
OASIS	Organizing for the Advancement of Solutions in the Sahel
PAR	Participatory action research
RISE	Resilience in the Sahel Enhanced
SAREL	Sahel Resilience Learning project
SROI	Social return on investment
USAID	United States Agency for International Development
WRS	Warehouse receipt system

## Executive Summary

High levels of food insecurity in the Sahel region of Africa have led many development agencies to fund programs designed to increase resilience in the communities impacted by environmental shocks attributed to climate change, reduced agricultural yields and population growth. One such strategy has been the implementation of warrantage, a rural financing mechanism that enables farmers to access credit by storing their crops as collateral.

**Purpose and methods.** This literature review seeks to consolidate existing research and evaluations on the topic in order to compare results of the efficacy of warrantage and to determine communities' perspectives on its utility in meeting their needs. Additionally, it aims to identify gaps in the literature and propose recommendations to help advance the knowledge base on effective practices for increasing resilience. Literature for this review was gathered using scholarly databases, online searches, bibliographies of relevant documents, and reports provided by some agencies implementing warrantage in the Sahel. The majority of literature found was published after 2008, but documentation from years prior to that was also included.

**Background.** Multiple terms are used in the literature to describe the practice of using crops as collateral for the provision of credit, including “inventory credit”, “warehouse receipt systems”, and “warrantage”. Warrantage has been practiced around the world for centuries, but the variation practiced most frequently in francophone West Africa is *warrantage paysan*. This variation is said to have arisen from FAO's *Projet Intransit* in Niger in 1999 and it differs from classic warrantage (also called warehouse receipt systems) because there is not a third party who manages the warehouse where the crops are stored. Everything is managed by the farmer group and the financing institution.

**Results.** Research and evaluations of warrantage has shown that warrantage users are more commonly male, have received at least some level of education, own land, and are not among the poorest segment of the population. Overall, the findings in the literature reported positive results regarding warrantage's ability to increase participating farmers' access to credit and increase their income. However, some reports note that that warrantage is not well suited for all contexts; in areas where market prices are too unpredictable or where prices do not rise to a certain level over the course of the year, warrantage will likely not be profitable for farmers. Benefits beyond increasing profits through postponing the sale of crops have also been described in reports.

**Challenges and deterrents for farmers.** Some of the most commonly reported challenges faced in implementation of warrantage were: ineffective participation of financial institutions, government intervention in the market, a steep learning curve, inadequate storage facilities, corruption/lack of accountability, and poor leadership/governance. Factors that were said to deter farmers from participating in warrantage include: restrictive requirements for participation, transportation costs for grain, high interest rates, distrust of the warrantage system, and difficulties that arise while working in groups.

**Conditions for success of warrantage.** In examining the successes and failures of warrantage programs as well as cereal banks, some of the most frequently cited conditions for success were:

1. Community is engaged and expresses interest in participating.
2. Farmers produce sufficient crop yields to participate.
3. Farmer cooperatives work together successfully.
4. Farmer group leaders possess the skills and education levels necessary to make warrantage profitable.
5. Adequate storage facilities are available for use.
6. Microfinance institutions are engaged as effective partners.
7. Market prices increase from harvest to *soudure* period.
8. Government policies allow a favorable environment for warrantage's success.

**Limitations.** Limitations of this literature review include the relative lack of available research or documentation reporting community perspectives on the practice, as well as only including documents written in French and English (which excludes both documents written in another language and findings/knowledge that have not been written down.) Important to note is that many of the reports found on warrantage were compiled by institutions that are funding these programs, so they may have some bias.

**Conclusions.** The information that has been compiled on the practice to date largely focuses on the financial viability of warrantage in supporting farmers having access to credit and increasing their income. Findings have shown that it has historically been successful in this regard for those that have participated, but that women and the poorest farmers are often excluded. Few longitudinal studies have been done to assess warrantage's sustainability, and no studies were found by this author that involved significant community participation, which can improve the accuracy as well as relevance of research findings. Important questions remain unanswered, which future research can help address.

**Recommendations for future research.** More information gathered by communities about their perspectives on the impact of warrantage and their assessment of its value compared to other approaches is essential. Approaches like participatory action research (PAR) or community-based participatory research (CBPR) can be applied to achieve this, as this author did not find any literature on warrantage using these approaches. Additional research that measures the non-financial benefits of warrantage will help deepen the understanding of its holistic impact; a social return on investment (SROI) methodology could be applied as one strategy for measuring this. Future research could address practical questions like when and where *warrantage paysan* is more effective than *warrantage détenteur*, and vice versa. It could also compare the impact of state-regulated warrantage systems versus those that are locally managed to help inform national strategies regarding the practice. An exploration of warrantage's relationship to food sovereignty would be helpful for expanding understanding of its long-term implications for communities.

## Introduction

Chronic and protracted food insecurity has been an escalating challenge for communities in the Sahel region of Africa. Countries in this region are particularly vulnerable to climate variability and change, which exacerbates the food crisis (Perez et al., 2015). Two of these countries, Niger and Burkina Faso, ranked 96 and 87 out of 104 countries, respectively, on the Global Hunger Index's measure of levels of hunger (IFPRI, 2015). With the majority of their populations engaged in smallholder farming, many interventions that seek to increase community resilience in the face of food insecurity are focused on supporting these farmers (African Smallholder Farmers Group, 2010). One commonly cited barrier to supporting farmers' rise out of poverty is the lack of access to credit in rural areas (Egah et al., 2014; Madulu, 2011; Onumah & Acquah, 2011).

## Purpose

In an effort to better understand practices that have been undertaken to enhance the resilience of these communities, a literature review on the practice of *warrantage* was conducted by UC Berkeley's OASIS Initiative on behalf of the Sahel Resilience Learning project (SAREL). SAREL is a project of USAID's larger Resilience in the Sahel Enhanced (RISE) Initiative that seeks to strengthen the capacity of key stakeholders in order to promote the adoption of resilience-enhancing methods and innovations. *Warrantage* in particular was selected for further review because it is considered by many organizations in the region as a promising practice for supporting smallholder farmers in the Sahel region. Agencies currently implementing the practice include USAID, Catholic Relief Services, Mercy Corps, and the World Food Program.

This review has several objectives:

- 1) to consolidate the diffuse existing literature on the topic in order to compare results of the efficacy of *warrantage*
- 2) to highlight the perspectives of farmers and communities to assess whether *warrantage* is meeting their needs
- 3) to synthesize lessons learned and recommendations that can assist *warrantage* implementers in increasing the effectiveness of their programs
- 4) to identify gaps in the literature so that unanswered questions can be prioritized for future research

## Methods

The material that informs this literature review was gathered through a variety of means to ensure the inclusion of as many written sources of knowledge about this practice as possible. In addition to using the scholarly databases of CAB Abstracts, AGRIS, and SCOPUS, specialized google searches were conducted to capture reports that were not published in peer-reviewed journals. Relevant sources were also gleaned from the bibliographies of the identified articles and reports. Lastly, organizations in the region which are practicing *warrantage* were contacted and solicited for any relevant documents that they knew of that might not be easily accessible to the researchers online. The majority of literature found was published between 2009 and 2015, but no literature was excluded based on its publication date. Findings from a wide range of African countries are included, as well as a few references to other regions.

The information was then organized to answer several key questions:

- Who is participating in and benefiting from warrantage?
- What is its impact?
- When and where is it most effective?

Two challenges that were encountered while reviewing the literature on this topic were that there are multiple adaptations of the practice and that it is called different names by different entities. Three common terms were found that are being used to describe similar or identical concepts: warrantage, warehouse receipt systems (WRS) and inventory credit. All three terms describe practices that share a common goal of increasing food security and use stored cereals as collateral to allow farmers to access credit. Cereal banks (CB) also involve storing cereals for the purpose of achieving food security, but there is generally not a credit component. However, CBs are included in certain sections of this review because some literature associates them with microcredit features, and because there are also important lessons learned from the implementation of CBs that can inform the development of warrantage.

After presenting the key findings, the challenges and lessons learned from both the successes and failure of warrantage and related practices are discussed, followed by a series of recommendations put forward in the literature for enhancing the impact of the practice. Lastly, this review notes its own limitations as well as the gaps in literature, and offers recommendations for future research.

## Background

There is a significant body of literature dedicated to describing the nature and causes of food insecurity in the Sahel, as well as the value of having access to credit for economic development. These topics will therefore only be briefly touched on in order to establish a general understanding of the context for why warrantage is considered a viable means for increasing resilience in the Sahel.

Agriculture accounts for 70% of Africa's labor force (United Nations Economic Commission for Africa, 2009). It is the primary source of revenue for 80% of Niger's population (Haut Commissariat à l'initiative 3N, 2016) and is practiced by 87% of the population in Burkina Faso (Yameogo & Guissou, 2014). Farming is how the majority of the population provides food for their family and generates income to pay other expenses. Given the extreme level of poverty among rural farmers in these countries, they are often forced to sell their crops directly after harvest because they need immediate access to cash (Egah et al., 2014). However, because of the increased supply of the products for sale on the market right after the harvest, this is when prices are generally lowest over the course of the year. If farmers were able to wait until later in the year to sell their crops when prices have increased, they would generate greater profits. A key barrier, then, lies in having access to cash to tide the farmers over until the time they sell their harvest.

**Warrantage** is a financial scheme designed to address this barrier. The term describes a system whereby farmers are able to store their products in a warehouse to be used as

collateral to obtain a loan from a financial institution (Coulter, 2009). In most warrantage systems described by the literature, this is seen as advantageous for farmers for several reasons: it allows them to delay the sale of some or all of their harvest to later in the year when they can typically sell them for much higher prices; and, they have access to credit in the meantime that they can use to conduct income-generating activities (IGA) immediately after the harvest, pay for agricultural inputs for the next planting season, or pay other expenses (Abdoulaye & Sanders, 2003; Adamu & Chianu, 2011; Chetaille et al., 2011; Egah et al., 2014). In some cases, warrantage increases access to additional financial services because farmers leave the process with a bank account, and sometimes a small savings. It can also improve their access to quality storage services, raise the quality of products being sold due to application of required quality control standards, increase farmers' bargaining power with buyers, and facilitate exchanges in the marketplace (Chetaille et al., 2011).

### Terminology

This section provides an overview of the different terms used to identify similar or different practices in existing literature in order to note key differences and clarify their relationships to one another.

Some literature on warrantage in West Africa distinguishes between **warrantage paysan** and **warrantage détenteur** (Coulter, 2009; Garrido & Sanchez, 2015; Le Magadoux, Mahamane, Déla Sida, & Van der Elstraeten, 2013; Yameogo & Guissou, 2014). The key distinction between the two forms is the type of actors involved. Both of these systems include a farmer group (*organisation paysan*) and a microfinance institution (MFI) or bank; however, *warrantage détenteur* also includes an independent third party who manages the warehouse where the goods are stored. In *warrantage paysan*, there is no third party; everything is managed by the farmer group and the MFI.

Some literature use the terms **warehouse receipt system** (WRS) and warrantage synonymously or as English-French translations (Chetaille et al., 2011; Cortès & Carrasco, 2013), while others discuss them as separate practices (Bellwood-Howard, 2014; Edelman, Lee, Mabiso, & Pauw, 2015). In their report examining the role and impact of Malawi's WRS, Edelman et al. (2015) indicate that warrantage may be an alternative practice to WRS that can address certain challenges that arise with WRS. They distinguish between the two by stating that warrantage does not include a receipt given to the farmer or farmer group that can be traded or sold in addition to being used for credit, while WRS does. Based on this report's description of the terms, WRS operates under the identical principle as warrantage, with its set-up being most closely related to *warrantage détenteur*. Given the considerable amount of literature on "warehouse receipt systems", this review retains the use of this term when it is used by the original information source, but considers it to be a form of *warrantage détenteur*.

**Cereal banks** (CB) buy and store cereals, and then sell them back to community members at a non-speculative price - often the cost of their original purchase price plus the cost of storing it (Chetaille et al., 2011). In many cases CBs serve the entire village, not just "members" of the CBs, and they may also lend out cereals during the rainy season that are repaid later, as in the Gambia (Eibisch, 2015).

Within the literature on CBs, there are conflicting definitions. Soumaila and Wada (2009) argue that some producer groups and NGOs call their structures “cereal banks”, but they are not true CBs if there is a commercialized aspect such as providing credit or selling the grain to make individual profits. Yet, a description of CBs in a village in Tanzania discusses how the benefits to community members differs depending on whether or not they are “members” of the CB (Msaki, Mwenda, & Regnard, 2013). Members can benefit from soft-loans and dividends from the banks’ various activities, and non-member farmers are able to store their products in a warehouse and obtain them at a future date at a more affordable price. Msaki et al.’s description of these CBs includes commercialized aspects such as receiving loans, which are also found in warrantage. This demonstrates once again the challenge in categorizing practices that do not fit neatly under established definitions.

Multiple types of CBs have been distinguished, including “classic cereal banks”, “community-based cereal banks”, “*soudure* (lean season) banks”, “village granaries”, “grain stores”, and “buffer stocks” (Soumaila & Wada, 2009). None of these include microcredit aspects, which separates them from warrantage.

**Inventory credit** is used in some journal articles and reports to describe the practice of using inventory as collateral for credit (Abdoulaye & Sanders, 2003; Baquedano & Sanders, 2006; Pender, Abdoulaye, Ndjeunga, Gerard, & Kato, 2008). Ndimubandi (2010) calls it the English translation of warrantage. Thus, it describes the essence of the practice upon which warrantage is built, that of farmers storing their crops and having them serve as a guarantee to financial institutions that they will be able to pay back any loans that they receive.

Cortes and Carrasco (2013) discuss **local food reserves** (LFS) in the Sahel, using it as an umbrella term that encompasses multiple practices, including warrantage and WRS (described as synonyms) and CBs. They categorize the above practices as **commercial local food reserves** (as opposed to **local food security reserves**). They suggest that the difference lies in who is storing the grain and who is providing the funds for the credit. In their explanation, CBs have a revolving fund that enables them to finance credit or purchase grain. If the funds come from a bank or MFI, then they consider it a WRS. The report also notes that these reserves operate differently depending on whether they are located in surplus-producing areas versus deficit areas.

These same authors also mention a term called **joint commercialization** (*commercialization groupée*). This practice does not fit neatly within the definition of warrantage or CBs. Rather, it involves farmers pooling their grain inventories to sell them jointly during the harvest season with the goal of obtaining better prices. It is not considered a classic “local food reserve” because it does not attempt to take advantage of seasonal price changes given that their sales are usually in the short term, and because the farmers do not get any credit for their portion of the inventory. Cortes and Carrasco note that this practice typically takes place in areas with surplus production, not in the most vulnerable areas.

**Village community granary**, in some cases, describes a CB (Soumaila & Wada, 2009); yet in others, as in Madagascar, it describes a system more closely aligned with *warrantage paysan*

(Fraslin, 2005). There, farmers are able to use the grain that they have stored as collateral to obtain credit, which is not common for CBs and could thus be categorized as warrantage.

### Variations of warrantage

As was previously mentioned, warrantage can be separated into *warrantage paysan* and *warrantage détenteur* based on the actors involved. These are the two practices that are the focus of this review. Even within each of these two forms of warrantage, though, there are many aspects of the practice in which differences have emerged.

**Actors.** In many reported cases, the practice of warrantage typically involves three actors: the producer, a professional stocker/warehouse operator, and the bank or MFI (Afrique Verte, 2010; Onumah & Acquah, 2011). In francophone West Africa, the warrantage system is reported by multiple sources as more commonly involving two actors: farmer groups and the MFI (Afrique Verte, 2010; Coulter & Mahamadou, 2009; Le Magadoux et al., 2013). This latter make-up fits the description of *warrantage paysan*, where there is no third party warehouse operator involved. Yameogo and Guissou (2014) argue that while Niger has been the leader in *warrantage paysan*, warrantage is more developed in East Africa in countries like Kenya, Malawi and Mozambique.

**Goals.** Beyond the actors involved, warrantage models can differ based on their specific goals within the realm of increasing food security. In a descriptive analysis of variations of warrantage in Benin, Egah et al. found nine warrantage models in Benin, five of which the researchers examined in depth. Information from interviews revealed that there were four main financial approaches to warrantage in the country: *Marketing-based warrantage* was more focused on “the flow of agricultural products on the market” and seen most often in East African countries like Malawi, Tanzania and Kenya (p. 476). *Inputs-based warrantage* prioritized “better access to agricultural inputs” (p. 477). *Income-Generating Activities-based warrantage* was considered a mechanism for financing IGAs in a decentralized setting, and *plural warrantage* blended the need to meet social obligations as well as access agricultural inputs.

**Individuals vs farmer groups.** The majority of case studies on warrantage describe farmers participating as members of farmer groups. According to a report by Garrido and Sanchez (2015), farmer groups in Burkina Faso must be legally recognized in order to participate in warrantage schemes. In some programs, farmers must be part of cooperatives or savings groups, such as in Tanzania (William & Kaserwa, 2015). Farmers in Ghana’s Technoserve program were described as forming groups of 20 to 50 farmers (Onumah & Acquah, 2011). Theoretical descriptions of warrantage describe individual farmers being able to deposit their stock and obtain credit (Afrique Verte, 2010), but few case examples in Africa describe this in practice. In some cases, farmers in a group pool their products in order to collectively deposit them in a warehouse and have access to credit from the MFI; in others, they deposit them as a group, but their individual stock is tagged separately.

**Storage.** Different reports use different terms for the types of warehousing options. Five types of warehouses for WRS were defined based on a microfinance conference in Mali (Bass & Henderson, 2000):

- *Public warehouses* – stock can be deposited by anyone wishing to store products there; membership is not required. Coulter (2009) cites examples of this in Uganda and Zambia.
- *Field warehouses* – an operator on the premises of another business manages stock, such as when raw materials are commissioned by a business but controlled by someone else.
- *Dual key warehouses* – stock is locked using two keys, with one key going to the depositor and the other to the bank or MFI. This system is commonly employed in *warrantage paysan* (Coulter & Mahamadou, 2009).
- *Self-managed or single key warehouses* – depositors maintain complete control of their stock in the warehouse, with some supervision provided by a bank or MFI. No case studies reviewed in this literature review were found to employ this system.
- *Trading warehouses* – the warehouse operator trades the stock on behalf of the depositor, as opposed to the depositor managing the sale him/herself.

**Management of stock.** In *warrantage paysan*, the stock is managed jointly by the producer group and the MFI. They may each take turns doing periodic checks to ensure the grain is secure and in good condition (Coulter & Mahamadou, 2009). In *warrantage détenteur*, the warehouse operator is in charge of maintaining the stock. This operator has been certified by the bank or MFI in advance.

**Credit-granting process.** In WRS (*warrantage détenteur*), producers receive a receipt upon depositing their crops at the warehouse and having them certified by the warehouse operator. There is often a minimum amount that must be deposited in order to participate. The producer takes the receipt to a participating financial institution where s/he can use it to obtain a loan. In Malawi's WRS, an electronic receipt is provided with information about the commodity and the depositor (Edelman et al., 2015). The WRS receipts provided by one particular MFI there are publicly available, and any changes to the deposit – be it withdrawals, transfers of ownership, etc. – are tracked online as well. Coulter reports that Uganda also began using electronic warehouse receipts that have “so far been well received” by both the producers and the banks (Coulter, 2009, p. 2).

In *warrantage paysan*, there is not an independent warehouse operator who verifies and manages the products and provides a receipt that is taken to a bank or MFI. Instead, there is a warehouse that is managed by a producer group or MFI, or both. Simply depositing the products and having them verified by the MFI results in the farmer having access to credit. Once received collectively by the farmer group, the total loan amount – often between 70% and 80% of the value of the stock at the time of harvest in Niger and Burkina Faso – is distributed proportionally to the amount that the individual farmers deposited (FAO, 2011; Garrido & Sanchez, 2015). The farmer group can only withdraw its products once the entire loan with interest has been repaid. If they default on their loan, their crops will be sold by the financial institution to make up for the loss.

In some cases, the farmers must pay back the loan and interest *before* being able to access their stock; they do this using the revenue they earned from IGAs conducted with the loan they received. This describes the *warrantage* system in Niger (Coulter & Mahamadou, 2009; FAO, 2011) and in Burkina Faso (Garrido & Sanchez, 2015). In some cases, MFIs will permit partial

withdrawals of stock over time for farmers to sell. Or, the MFI will arrange for the sale of the stock by the farmer and reimbursement of loans and fees to the MFI to happen simultaneously by opening up the warehouse. Once the producers pay back the loan and interest, they can then withdraw their crops from storage and sell them or use them for domestic consumption.

Another approach involves the farmers being able to sell their crops in order to pay back the loan. Onumah and Acquah (2011) explain this as the process in the Ghana's Technoserve program. Technoserve staff advised farmers on strategic times to sell, and the farmers would choose when they wanted to sell. Payments would be made to Technoserve, and once all the grain had been sold, the profits would be proportionally distributed to farmers, minus any loans and fees that the farmers owed.

In some cases there are no restrictions on how farmers use their credit, while in others they must be used for IGAs or investing in agricultural inputs (Egah et al., 2014)

**Sale of stock.** In some programs, the farmer group collectively sells all of the stock that was deposited by its members together, and the profit is distributed proportionally to members based on the amount they had stocked (Coulter & Mahamadou, 2009). Some groups opt to sell all of their stock at one time, which is when they estimate market prices to be at their peak. Others sell in phases to reduce the risk of selling at unexpected price drops (Onumah & Acquah, 2011). In other programs, even when individual farmers are part of a farmer group, the farmers determine individually when and to whom to sell their stock (Le Magadoux et al., 2013).

**Technical assistance provided.** In the inventory credit model in Ghana (*warrantage détenteur*), Technoserve agents advise farmer group leaders on setting sales strategy and a 'trigger' price as the lowest price for which the group will sell their grain (Onumah & Acquah, 2011). Technoserve tries to link their producers with large-scale purchasers who will buy grain in bulk. This was the case for the East African Grain Council (EAGC) and USAWA programs in Kenya and Tanzania (Chetaille et al., 2011). Not all programs report having this support component.

**Level of regulation/administration.** In some countries, WRS (*warrantage détenteur*) is implemented on a national level with government involvement. In the U.S. and France, the system was regulated with national legislation (Joubert, 1933; Jovičić, Jeremić, Milićević, & Zeremski, 2014). *Warrantage paysan* is often managed at the local level or regional level, with joint collaborations between development programs/donor agencies, MFIs and farmer groups.

For Niger and Burkina Faso, this author was unable to find evidence of the governments' current orientation to warrantage. The *Haut Commission à l'Initiative 3N*, which is Niger's government entity responsible for the "Nigeriens Feeding Nigeriens" initiative, reported that one of their investments from 2012-2015 was the construction of 334 warehouses for warrantage (Haut Commissariat à l'Initiative 3N, 2015). While this report does suggest the government is investing resources in expanding warrantage, it is not clear if the government is involved in any aspect of regulation or if investment is going to continue. Oxfam reports that the government of Burkina Faso is considering instituting a wider warrantage program, but the

source of that claim was not indicated (Oxfam, n.d.). In 2014, Yameogo and Guissou reported that there was an absence of national regulation and a lack of consistency among actors regarding the practice in Burkina Faso, but this author is not aware of how and if that has changed in the interim.

### How and where has warrantage evolved?

While some reports and articles suggest that warrantage began in Niger in the 1990's with the FAO and International Crops for the Semi-Arid Tropics (ICRISAT) (Adamu & Chianu, 2011; Tabo et al., 2011), it appears that this specifically refers to *warrantage paysan*. There is evidence that *warrantage détenteur*/WRS existed long before that time and in locations around the world. Coulter and Mahamadou (2009) claim that warrantage dates back to antiquity, being present in Mesopotamian and Roman civilizations. In his 1933 book, *Warrantage des Produits Agricoles*, Joubert describes the presence of the warrantage in France following the passage of a law in 1893 that created *warrants agricoles* (Joubert, 1933). The data he reports shows that the practice also existed in Algeria under French colonization.

There are historical descriptions of WRS in the United States as far back as the 19<sup>th</sup> century. Jovičić, Jeremić, Milićević, and Zeremski (2014) claim that the warehouse receipt system was created and developed in the United States, citing the 1913 Warehouse Act. Galtier and Vindel (2012) present an example of what they call warrantage from the mid-1800's in the city of Chicago in the United States, (see Cronon, 1992 as cited in Galtier & Vindel, 2012). In the United States, WRS eventually became a state-monitored system where receipts were provided that were dependent on grain quality and could be used to obtain credit; this resembles the warehouse receipt system currently being overseen by the Government of Tanzania (Madulu, 2011).

Other governments are also reportedly looking into the practice as well. Galtier and Vindel reference EAGC's work with the Kenyan government, which they suggest became interested in warrantage following EAGC's pilot study in 2007. The partnership's goal was to work towards a nationally legislated system of warrantage. EAGC was also working with the Tanzania Warehousing and Licensing Board and the Uganda Commodity Exchange. In 2005 Malawi established its first public warehouse receipt system by the Agricultural Commodity Exchange for Africa ("Warehouse receipts, a creditable solution," 2013).

Jovičić et al. suggest that the last 15 years have seen significant efforts to strengthen WRS as a financing mechanism in Eastern Europe and Central Asia, backed by support from USAID, EBRD, and the World Bank. The World Bank has generated assessments in different countries to look at rural financing tools and has suggested warehouse receipt systems as options to be pursued in countries such as Cambodia (World Bank, 2015), Myanmar (De Luna-Martinez & Anantavasilpa, 2014), and Turkey (World Bank, 2006). A 2015 technical summary of a working paper by Höllinger, Rutten, and Kiriakov lists the following countries in Eastern Europe and Central Asia as having partially developed WRS: Poland, Russian Federation, Romania, Ukraine, Turkey, Croatia and Serbia. Countries like Bulgaria, Kazakhstan, Hungary, Slovakia, Moldova and Lithuania were categorized as having fully developed WRS. This demonstrates that as a rural financing tool, warrantage is being currently practiced and adapted around the world. While there are conflicting reports as to where warrantage originated, it is clear that it is being

implemented in a diverse range of countries and has been adapted to suit different contexts and different needs.

### **Niger & Burkina Faso**

Coulter and Mahamadou (2009) and others have attributed the origins of the new *warrantage paysan* to FAO's 1999 Projet Intrants in Niger. The project arose out of an effort to increase farmers' uptake of the practice of fertilizer microdosing. By helping farmers increase their revenue through delaying the sale of their crops to later in the season, *warrantage paysan* would enable them to buy more inputs for the next season and thus to have more crops to sell and to feed their families.

The year before the start of the FAO project, the Ministry of Rural Development (MRD) in Niger reportedly began pilot testing a "warehouse receipt system" with the goal of helping producer groups pay for inputs for the harvest (Bass & Henderson, 2000). In the first year of the pilot, producers saw a 38% increase in revenue, and it is said that the Ministry saw improvements in farmers' profits in the few years following the pilot as well. Information about the outcome of this pilot test and its influence on government policy was not found by this author.

Worth mentioning in a summary of the history of warrantage in Niger is Soumaila and Wada's (2009) description of how colonial powers put in place a food security system in the 1910's using grain reserves (*greniers de reserves* and *les Sociétés Indigènes de Prévoyance (SIP)*) throughout French West Africa. Unlike with warrantage, there was no microcredit component associated with the colonial system, but it may still be considered relevant to the evolution of warrantage because of the negative experiences communities reportedly had with it. SIP participation was decreed to be mandatory in 1915. These SIPs involved metal silos for storage that Soumaila and Wada say are still visible in many villages in Niger, but they did not achieve their objectives of food security. Rather, the authors describe how they often increased discontent among the population due to the coercive nature and lack of transparency in their management. At independence, the practice was terminated, but the droughts of the 1960's and 1970's led to the creation of an *Office des Produits Vivriers du Niger (OPVN)* that maintains grain stores through the country. More recently, cereal banks have arisen as a variation that emphasizes voluntary involvement of the population and prioritizes the autonomy of communities; *warrantage paysan* may be considered to be in the same vein. Several reports on warrantage described how a barrier to its success was a legacy of distrust by community members about cooperatives or communal storage (Chetaille et al., 2011; Edelman et al., 2015; Ndimubandi, 2010). Farmers cited past examples of corruption or mishandling of goods as barriers, which is reminiscent of the manner in which Soumaila and Wada describe the colonial grain reserves a few generations earlier.

Today, *warrantage paysan* is being practiced throughout Niger and Burkina Faso. In Niger, Coulter and Mahamadou (2009) report that adoption of the practice has been increasing. They note, though, that the increase in volume of the activity in Niger hides important inter-regional differences. They report that warrantage has decreased in Maradi, and there is a concentration of the activity in Konkorido and Gadambo. So, the practice may be expanding in some parts of the country, but diminishing in others. In terms of the use of warrantage in relation to the

quantity of crops produced in the country, Coulter and Mahamadou state that the amount stored in warrantage represents just 0.1% of the production of grains and legumes in Niger. When they compare the amount of paddy stocked in Niger to that in Madagascar, they find that Nigerien farmers stock less than 10% of what Malagasy farmers stock. This begs the question of why more crops are not stored in Niger using warrantage, which is addressed later in the results section. Also addressed further in the results section is a report by Afrique Verte (2010) that found that warrantage of millet in Niger was profitable for farmers in 71% of cases; this led the authors to conclude that warrantage is a risky practice for farmers since it was unprofitable in 29% of cases.

A report from Burkina Faso's Ministry of Agriculture and Food Security indicated that in 2012, there were 8,293 people belonging to 133 farmer groups that were practicing warrantage in Burkina Faso (Yameogo & Guissou, 2014). An average annual increase of 135% was seen in the number of participants per farmer group from 2008-2012. However, the report notes a negative effect on the impact of warrantage resulting from the government's management of public stocks. It discusses the importance of Burkina Faso devising a national regulatory framework and legislation to support the practice. As previously mentioned, more recent information about the status of any current government initiatives regarding warrantage was not found by this author.

## Results

The following section reviews the results of studies and reports that evaluate various aspects of warrantage, including the impact of specific warrantage programs. While there are many reports on the prospects of warrantage for addressing food insecurity, there are relatively fewer evaluations of its actual efficacy, particularly of *warrantage paysan*. Within the literature, there is a larger body of research on "warehouse receipt systems", with Tanzania appearing to be one of the most studied African countries based on reports and articles available online (Chetaille et al., 2011; IFC, 2012; Madulu, 2011; Mwamfupe Davis, 2014). There are few longitudinal studies to assess the sustainability of warrantage when it is initiated by NGOs or external funders compared with research that is available for cereal banks.

### Who is participating in and benefiting from warrantage?

Various studies of warrantage have sought to identify which segments of the population participate most frequently in warrantage. Also critical to determine is who is primarily benefiting from the practice; this permits an assessment of whether warrantage is reaching the demographic that is targeted by particular programs.

**Gender.** Some of the literature reports on gender inequalities in the practice of warrantage. In a study of Cigaba Union's warrantage system in Niger, Le Magadoux et al. (2013) show that even though there are no formal restrictions against women's participation, they are often excluded because they are left out of decision-making processes and also have limited access to land and production inputs. In addition, they find that accurate data on women's participation is hard to find because women often warrant their products under the name of someone else. This may be because they are unable to produce the minimum amount required to obtain credit, or that they are not permitted to stock it in their own name by the head of household. Thus, even if they are able to engage in warrantage in this manner, they are completely

dependent on the reliability of the person who is warranting their products in order to access credit and profits from their crops.

In Tanzania, a study on WRS provided data on its randomly-selected sample of WRS-users, revealing that 73% of farmers in the survey were male, compared to 27% female (William & Kaserwa, 2015). The authors suggest that this means that awareness and participation in WRS is higher for males despite the fact that the general population consists of more females than males.

**Age.** In the same Tanzania study, the majority of participants were found to be “middle to old age” (William & Kaserwa, 2015, p 44). The authors discovered during focus group discussions that this may be because of the negative view that youth have of agriculture. However, the opposite characteristic was found in Madulu's (2011) WRS study in Tanzania, with younger farmers shown to be more likely to engage in WRS. Madulu found that age had a negative effect on participation, meaning that older farmers appeared less inclined to participate. This was hypothesized by Madulu to be due to additional activities and costs associated with WRS – such as sorting, verifying the quality, packaging, and storing – that older farmers may have been less inclined to take on.

**Education.** Madulu's study showed that WRS participation was positively associated with education level. He suggests that this implies that more educated farmers had a greater likelihood of participating because education enhanced farmers' ability to master concepts and information regarding WRS. This finding is supported in other reports that have cited barriers to usage of warrantage as illiteracy or low education levels (Le Magadoux et al., 2013). William and Kaserwa's Tanzania study corroborate this as they found that the majority of respondents (77%) had achieved at least a primary education.

**Land ownership.** Land ownership was found to be positively associated with WRS participation in Tanzania (Madulu, 2011). Owning more land generally permits greater production capacity, increasing the likelihood of generating a surplus that can be stored and sold later through WRS.

**Poverty level.** Several reports demonstrate that those practicing warrantage are not the most vulnerable farmers; rather, it is those who have a surplus after their harvest who are able to participate. Garrido and Sanchez say that it is primarily the men in households who are directly benefiting, and Chetaille et al. (2011) suggests that warrantage is a tool for speculation to increase revenue for the producers who are more comfortably positioned as opposed to giving access to credit to increase revenue for the most poor. A case study of WRS in India described how the system does not cater to smallholder farmers (IFC, 2012). Rather, it is the large farmers, traders, agro-businesses, and government entities that are most commonly participating, with small farmers involved if they are able to pool their resources with other farmers and designate a single representative.

A study of Ghana's inventory credit program (ICP) implemented by Technoserve showed that it was not reaching the very poor as well as other MFIs in the region were doing (Onumah & Acquah, 2011). The research used quantitative data from 1996-2003 and interviews with

project staff and members to look at two performance indicators: the number of women served and loan size, both deemed to be proxies for the poorest farmers. The researchers found that the ICP “reached the poor with a depth of 25% to 47% (nationwide) measured in terms of loan size/GNP per capita” (p. 161). Their other indicator of outreach – percentage of female clients – saw an increase from 20% to 59% over the period of study. When they compared these to two other MFIs that are successful in Ghana, they determined that the ICP did not do well in reaching the very poor. In terms of operational and financial sustainability, they found the ICP to be successful, though it had low efficiency ratings based on adjusted operational expenses ratio. Ultimately, the authors argue that their findings support previous claims by Hulme and Mosley (1996) that there is a tradeoff between outreach to the very poor and financial sustainability. They found that over time, the ICP drifted away from their target population of the rural poor. This is an important potential consequence to consider for warrantage programs because there is greater cost associated with providing microcredit to the very poor; it requires greater resources to investigate creditworthiness, provide training to recipients, manage the loans, etc. Thus, financial institutions may be tempted to shift their clientele in order to achieve greater efficiency at the expense of supporting the most vulnerable.

The findings above show that warrantage users are more commonly male, at least minimally educated, land-owning, and are not among the poorest segment of the population. This suggests that if warrantage hopes to increase food security for the most vulnerable, then the program may require supplemental efforts in order to support the poorest farmers’ entry into the system.

### **What is the impact of warrantage?**

Overall, the evaluations that were found through this literature review showed positive results regarding warrantage’s ability to increase farmers’ access to credit and their income. Some reports do note, though, that warrantage is not well suited for all contexts and there are instances where it proved to be unsuccessful.

**Increasing smallholder farmers’ access to credit.** A study of WRS in Tanzania showed that it did indeed increase access to credit from formal financial institutions in Tanzania. The cross-sectional survey of 84 farmers found that a majority (88%) of WRS-participating paddy farmers had access to credit compared to only 41% of WRS non-participating paddy farmers (Madulu, 2011). A study of fertilizer microdosing combined with warrantage in Burkina Faso, Mali and Niger cites the benefits obtained by Malians in practicing warrantage. The authors argue that it is an “excellent opportunity” for producers to access credit in addition to getting better prices for their crops (Tabo et al., 2011).

**Increasing smallholder farmers’ income.** In an earlier version of the previous study, Tabo et al. (2007) calculated that farmers in Mali who were practicing both fertilizer microdosing and warrantage in 2002-2003 saw their incomes increase by 52 to 134%. Adamu and Chianu (2011) conducted a case study of warrantage in Nigeria’s Jigawa state and determined that the price difference between the farmers selling their products at the lowest and highest points would yield an 81% gain over what they would have made selling it during or right after harvest. The researchers argue that warrantage in this state is successful - to the point that farmers from

outside of Jigawa are interested in adopting it - and that it should be scaled up throughout northern Nigeria and other similar environments. One of the benefits they identified from their intervention was the formation of farming groups, which helped raise farmers' awareness of the benefits of collective action and how to gain negotiating power. This also simplified linkages to financial institutions that facilitate the warrantage system. While the researchers' ability to create an intervention group for study was positive, there was no control group set, which might have provided greater clarity about the true benefits of the training and the warrantage practice for that particular year.

Significant income gains were also reported for farmers in the Technoserve inventory credit program in Ghana in 2000 (Kwadzo 2000, as cited by Bass and Henderson, 2000). The researcher found that by delaying sales of their inventory, farmers were making 75% to 270% more than if they had sold it immediately after the harvest. Interestingly, results showed that because the program was proving to be so successful at increasing farmers' income, more institutions and groups were entering the market, including the government. This meant a greater supply of maize on the market and thus a reduced increase in profits for farmers because the price was smoothing out over the year. It is mentioned that farmers were still benefiting more than they would have otherwise, but that it would be hard for MFIs to sustain the program. This finding suggests that even if warrantage becomes successful, if it maintains its success for a certain period of time, its positive benefits may eventually lead to it becoming less beneficial to smallholder farmers over time.

A *warrantage paysan*-like system in Madagascar benefited 9,000 out of 40,000 members of savings and credit cooperatives in 2000 (Fraslin, 2005). Members obtained MGF 13 billion<sup>1</sup> in credit through "village community granaries" and ultimately gained a financial surplus of about MGF 19.1 billion. This translates to an additional income per household of MGF 1 million. The description of these results does not include information about the context that year in terms of climate, crop production, etc., so it is hard to assess if these positive results could be expected to continue.

In an analysis of multiple warrantage programs in Tanzania and Kenya, Chetaille et al. found that prices needed to increase seasonally between 7% and 36% to be profitable for the farmer, depending on the program in which they were involved. The authors found that in most cases, prices did increase sufficiently for participation to be profitable. In the case of Kenya's program operated by EAGC under ACDI/VOCA, seasonal prices needed to increase by at least 6.5%. This low threshold was due to the low stocking fees associated with storage because of the economy of scale and the absence of financial intermediaries. However, the impact on smallholder farmers was limited because of the slow pace of adoption of the practice. A case study in Tanzania of USAWA – a network of 25 Savings and Credit Cooperative Organizations – found that USAWA farmers' revenue increased by 20% over three years through the use of warrantage. But, use of warrantage decreased over the period due to losses during one particular year, suggesting that a single year of losses may deter farmers from continuing to use it. A WRS program in Tanzania called Agricultural Marketing Systems Development Program

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<sup>1</sup> In 2005 the malagasy franc (MGF) was replaced by the malagasy ariary (MGA), but at the time of Frasin's report, Mgf 13 billion was worth over USD 2 million

was found to earn farmers 37% more by postponing the sale of their harvest (Chetaille et al., 2011).

A report by Afrique Verte (2010) states that while warrantage of millet in Niger was profitable for farmers in 71% of cases, it is a very risky practice for farmers as they bear the brunt of the risk compared with the MFIs involved. By tracking seasonal price changes over the period of 2001 to 2010, they calculated that the price of millet has to increase by 17.5% from harvest to sale so that the producer breaks even. Based on the price data they tracked over the 9 years, warrantage was not profitable for producers in 29% of cases. Their data also shows that only in 9 out of 34 cases did the farmer group profit more than the MFI did. While the authors cite certain limitations of this assessment, the data they gathered leads them to conclude that warrantage of millet in Niger involves significant risk for producers.

**Reducing price risk in the market.** In their review, Chetaille et al. determine that despite some literature claiming warrantage can be a tool to reduce price risk, this is not the case based on their analysis of four cases. Instead, they find it to be a tool for speculation, which admittedly has a good chance of success and increases overall average revenue, but it does not reduce risk. Although warrantage itself does not decrease price risk, Chetaille et al. note that by requiring cooperative negotiations by farmer groups for better prices, warrantage does indirectly reduce risk for farmers.

Other benefits of warrantage have been described anecdotally, as they may be harder to measure in an evaluation. These include:

- **Improving the quality of the grain on the market.** This results from requiring farmers to meet certain product standards in order to participate (Chetaille et al., 2011).
- **Access to money throughout the year.** By obtaining credit after the harvest, using it to generate income, and then being able to sell crops later after paying back the credit, farmers can have steadier access to cash throughout the year (Garrido & Sanchez, 2015).
- **Greater autonomy for individuals.** Greater financial resources allows for greater individual autonomy in making decisions that are not as constrained by financial necessity (Garrido & Sanchez, 2015).
- **Improving crop storage conditions.** Crops are stored in better conditions where they are monitored and overseen by a group, which translates to less product loss and more stable food access (Garrido & Sanchez, 2015).
- **Price transparency on the market.** Because warrantage is commonly practiced with farmer groups as opposed to individuals, flow of market information is increased. Farmers are able to make more informed decisions regarding the sale of their product as opposed to making a deal with little knowledge of actual going rates (Bass & Henderson, 2000).

### **When and where is warrantage effective?**

Econometric analyses for Burkina Faso, Niger and Northern Togo that forecast whether or not warrantage would be a beneficial practice in various locations projected success in some cases, but not in others. These scenario-building models are useful in that they can provide more

context-specific predictions of whether it is worthwhile to invest in building the infrastructure necessary for a successful warrantage system. However, since they are not evaluating the actual implementation of warrantage, the results are hypothetical and may not take into account all constraints or opportunities that surface during implementation.

Forecasting of the North Central region in Burkina Faso found that warrantage would most likely *not* be profitable there based on the researchers' scenarios (Garrido & Sanchez, 2015). Of the four crops that were analyzed, cowpeas were shown to be potentially the most profitable crop to exploit for this practice. The researchers qualify their findings by saying that even though farmers may not increase their income from crop sales, there are additional benefits to warrantage that merit consideration when evaluating whether or not to invest in warrantage, including those anecdotal benefits listed above.

An agent-based modeling study simulating individual's decision-making behavior in three Nigerien villages found that a maximum of 25% of the population would likely engage in inventory credit and increasing use of organic fertilizers (Saqalli et al., 2011). The study found that involvement in inventory credit and use of inorganic fertilizers only happens where it is possible to save millet; this was not the case in one of the villages studied, and only possible to a limited extent in the other two. They argue that inventory credit had a greater impact than fertilizers, but that these interventions required an investment capacity not present among many in the studied villages due to the ratio of the food required by each family compared to its "manpower".

More favorable expectations for Niger were reported before Saqualli et al.'s study by Abdoulaye and Sanders (2003). Using economic modeling to analyze the effects of adopting "improved Fertilizer Based Technologies" as well as warrantage, they found that expected farm income was greater with the adoption of the proposed two practices compared to what was currently being practiced. The combined effect of the introduction of new technologies and warrantage was found to yield a 49% increase in expected farm income.

Another modeling study in Niger compared two different versions of inventory credit programs: a program that was in place in Western Niger through FAO's *Projet Intrants* that focused on farmers generating savings for the purpose of reinvesting them in buying fertilizers, and a hypothetical "traditional" inventory credit program where farmers would keep the profits and use them how they wished (Baquedano & Sanders, 2006). According to the model results, the authors found that the current program did increase fertilizer use and incomes of participating farmers over non-participating farmers, but the income increase was only 8%. They forecasted that if the more traditional (hypothetical) model were adopted, farmer incomes would rise even more and farmer use of fertilizer would be even greater than through the program that was being practiced at the time. Based on the rest of the literature covered in this review, it appears that this latter model – the more traditional inventory credit approach – is what is primarily being practiced today.

Northern Togo was projected to experience potential positive gains from warrantage. Konlambigue (2007) conducted an econometric analysis using data on monthly maize prices from 1999 to 2004 and concluded that inventory credit could be a favorable solution there, but

that further analysis would be needed to verify whether the revenue gained by waiting to sell crops would sufficiently cover the costs associated with the practice. The inventory credit program he proposes resembles *warrantage paysan*.

Multiple reports caution against assuming that warrantage will work in any context where smallholder farmers are vulnerable. In examples cited of Technoserve in Ghana and the Ministry of Rural Development in Niger, it is determined that WRS (*warrantage détenteur*) is best suited to areas where organized producer groups can negotiate collectively in the marketplace (Bass & Henderson, 2000). Another report suggests that warrantage should be viewed as just one among many tools to consider when seeking to alleviate poverty, given that it does not serve all segments of the population equally (Saqalli, Gérard, Biolders, & Defourny, 2011). Coulter (1993) warns against farmer storage being considered universally beneficial. He says that it may be helpful in cases such as when farmers are constrained by cash flow problems and would benefit from accessing group loans. However, in other cases, farmers have enough incentive to store their crops at home if they have the storage capacity. The literature emphasizes that warrantage can only be profitable where there is a sufficient seasonal price variation from the time of harvest to the lean season in order to make it worthwhile for farmers to pay the extra costs associated with it (Garrido & Sanchez, 2015; Konlambigue, 2007).

It may be noted that the majority of studies and evaluations on warrantage are reporting on how well it increases farmers' access to credit and how much it increases their income. Few studies go the extra step of explicitly assessing whether this is resulting in increasing food security in their evaluations. It is assumed that these two factors lead to more financial security and ability to both produce enough crops for sustenance and a surplus to sell in order to have income to pay for other necessities. Examining whether this is indeed the case in these countries by looking at unrelated studies was beyond the scope of this review. However, it is an important aspect to consider when looking at the true value of these interventions.

Unanswered questions remain regarding the larger question of when and where warrantage is most effective. Recommendations for future research are offered at the end of this review to help fill in these gaps.

### **Is warrantage more effective than cereal banks?**

Cereal banks have existed in West Africa longer than *warrantage paysan*, and have served primarily as a means of increasing food availability and accessibility to community members. Thus, this question of the effectiveness of warrantage systems versus CBs is important in terms of knowing which interventions – or aspects of them – should be prioritized. However, the reviews of CBs show mixed results, and this author did not find any studies comparing the effectiveness of warrantage and CBs, making it a difficult question to answer.

Sustainability is a commonly cited concern regarding CBs. A case study on CBs in the Gambia reported that three of the seven villages that were examined in the study had lost their CBs before the research began (Eibisch, 2015); the CBs had worked for three to nine years before they closed, being unable sustain themselves once the NGOs and donor organizations withdrew their support. In a study of 215 CBs in Chad, Mali and Niger, Mariko et al. (2012) argue that while CBs are at risk for unsustainability, they are still an effective tool. They found

that 80% of the surveyed CBs sold their grains at prices below market value, which they say makes their sustainability uncertain. About one third of the surveyed banks were operating inefficiently, given that they were losing money. The authors explain this may be because there were functioning more as a social protection mechanism, giving out cereal on credit to the most vulnerable households to pay back after the harvest. Despite this, the authors indicate that CBs are providing “better marketing services to consumers” (p. 15) and should not be dismissed.

In terms of sustainability, warrantage may be considered advantageous to CBs because its sustainability is enhanced by one actor (the MFI), holding collateral of the other actor (farmer group) to ensure that if a loan is not repaid, the MFI can recuperate its losses. For a CB, if grain is not paid back, then it is difficult to recuperate the loss and sustain operations. However, longitudinal data on the sustainability of warrantage programs is limited, so accurate comparison of sustainability between CBs and warrantage is challenging.

In terms of achieving their goal of increasing food security, studies on CBs yield different results. Mwamfupe Davis (2014) evaluated CBs in three different Tanzanian villages. He claims that the results of the study indicate that the performance of the CBs was “dismal”. Ninety percent of the 180 respondents reported that the CB in their village had been unsuccessful at improving food security. Information gathered from the interviews, focus groups and survey indicated several reasons for the poor performance: insufficient amounts of cereals deposited in the bank, stock decapitalization due to delays or non-payment of the loans, lack of understanding by the leaders of good business practices, and an attitude of dependence on donor assistance from the CB members.

Alternatively, a study in the Gambia showed that CBs were important for the food and nutrition security of communities, households, and individuals (Jatta, 2014). The results showed that there were lower prices and reduced price variability by an average of 25% in cereal-banking communities. This purportedly increases food accessibility. Jatta states that his analysis also implies that cereal banking “enhances food self-sufficiency” by 11.6% on average (p. 26). A study that surveyed CB members and non-members in Makoja village in Tanzania found that CBs were considered beneficial by members (Msaki et al., 2013).

In summary, the mixed reviews of CBs make it difficult to name a clear winner between cereal banks and warrantage in terms of which practice better enhances community resilience. For Niger, Coulter and Mahamadou (2009) argue that warrantage appears to be a better tool than CBs for increasing food security during the lean season in the south of the country. Yet the success of either practice appears highly dependent on the context given that there are many variations in implementation in addition to climate variables that impact production on a year-to-year basis.

## Discussion

The results described in the previous section show largely positive outcomes for warrantage in terms of increasing access to credit and boosting farmers’ income. Also significant is the caution put forth that warrantage is not a suitable practice for every location. Some other key findings

include that warrantage is often not accessible to the poorest farmers and that women participate less frequently than men. Warrantage has been shown to address some of the challenges faced by cereal banks, yet it also shares some of the same obstacles.

This section looks at the challenges and benefits that were encountered in implementation of warrantage, as well as the lessons learned from successes and failures.

### **What challenges are faced in implementation of warrantage?**

**Ineffective participation of financial institutions.** Given the essential role that MFIs and commercial banking institutions play in warrantage, their engagement is critical. Some challenges that were reported in seeking to obtain effective MFI involvement were transportation costs for the MFI to assess stored goods in rural areas and the logistical challenge of setting up appointments between the producer and the MFI to meet at the warehouses (Bass & Henderson, 2000).

**Government intervention in the market.** This was cited in numerous reports as a potential barrier to successful implementation of warrantage (Abdoulaye & Sanders, 2003, 2006; Edelman et al., 2015; Jovičić et al., 2014; Yameogo & Guissou, 2014). If governments inject grain reserves into the market or provide subsidies during times of low food availability, this may reduce demand for locally-produced cereals because there is greater availability on the market. This undermines the ability of farmers to generate profits by postponing the sale of their stock until later in the year. Similarly, the influx of food aid from external sources affects market prices for cereals. Using a farm level programming model, Abdoulaye and Sanders (2006) found that the only government policy that significantly increased returns for farmers during adverse rainfall years in Niger was that of *not* intervening. Thus, if warrantage is to be considered by governments as a viable strategy, then they must consider the impact of their current policies on its efficacy.

**Steep learning curve.** There were mixed reports about whether or not warrantage has a steep learning curve that acts a barrier to implementation. In discussing WRS (*warrantage détenteur*) in Malawi, Edelman et al. say that this did present a challenge for making the system work for smallholder farmers. However, reports on *warrantage paysan* say that the system is relatively easy to use, which – if true – may be considered an advantage over *warrantage détenteur* (Coulter & Mahamadou, 2009; Le Magadoux et al., 2013).

**Inadequate storage facilities.** In a study on CBs in Chad, Mali and Niger, lack of adequate storage facilities was reported as a challenge by farmer groups (60% of groups reported it in Chad, 38% in Mali, and 31% in Niger) (Mariko et al., 2012). The shortfall could be in the form of insufficient space in facilities, limited ventilation, poor roofing material, etc. (Ndimubandi, 2010). Given that warrantage also relies on sufficient storage facilities, this is a challenge they have in common with CBs. Absence of storage facilities was the most frequently cited difficulty from warrantage-practicing farmer groups who were interviewed in Burkina Faso, with 58.4% of groups indicating this a challenge (Yameogo & Guissou, 2014).

**Lack of accountability/corruption.** Field interviews on CBs in Niger reveal that impunity for those who engage in corrupt practices, along with inappropriate involvement of local

traditional leaders in managing the stocks and resources, are important challenges (Mariko et al., 2012). Lawrence (1998) mentions that support agents can end up taking advantage of those they are meant to be helping. The absence or poor quality of monitoring systems make it difficult to ensure accountability, both for CBs and for warrantage.

**Poor leadership/governance.** Lack of training for those overseeing CBs was reported to be a challenge in Chad, Mali and Niger (Mariko et al., 2012). Lawrence says that CBs often make management errors and poor decisions influenced by “slow collective decision-making and social pressures”. Similar errors on the part of farmer group leaders participating in warrantage negatively impact their ability to achieve the greatest success.

### What are the risks?

Warrantage is a speculative activity; profiting from it depends on price increases of crops over the course of the year. If farmers wait too long or not long enough to sell, they risk not recuperating the costs of storing and thus not being able to pay back credit (Bass & Henderson, 2000; Garrido & Sanchez, 2015). During years of especially low crop yields, in which warrantage would theoretically be more profitable because there is less supply available on the market, it is likely that the poorest farmers would not benefit because they would have no surplus with which to participate. But the years in which yields are high enough to allow the poorest farmers to store a small surplus warrantage may not be particularly beneficial to them either. These are years where most producers would have a surplus, resulting in reduced seasonal variability in food crop prices (Garrido & Sanchez, 2015).

### What deters farmers from adopting the practice?

Qualitative results from various reports reveal several factors that impede the uptake of warrantage by farmers:

**Restrictive requirements for participation** (William & Kaserwa, 2015). In Malawi, farmers had to have a government-issued ID to obtain credit, which served a potential barrier; additionally, the minimum deposit required may be too high for most smallholder farmers (Edelman et al., 2015). In Kenya, in addition to needing to form farmer groups, farmers also had to open individual commercial bank accounts (Chetaille et al., 2011). These are a few specific examples of the obstacles to entry that farmers may encounter.

**Transportation costs.** Depending on its location, transportation of the product to the warehouse may be costly, deterring or preventing farmers from participating (Edelman et al., 2015).

**High interest rates** (Bass & Henderson, 2000). Interest rates for *warrantage paysan* credit were reported to be between 5% and 13% for farmers in Burkina Faso (Garrido & Sanchez, 2015). For the most vulnerable farmers, this may be more than they are willing to risk.

**Distrust of the system.** Farmers who have a history of negative experiences with cooperative efforts may distrust the system and not want to get involved (Chetaille et al., 2011; Edelman et al., 2015; Ndimubandi, 2010).

**Difficulty working in groups** (Chetaille et al., 2011). There are opportunity costs associated with working in groups, and this manner of doing business may not appeal to all farmers.

### **What did farmers appreciate most?**

A few studies on warrantage included the perspective of the farmers who were participating, seeking to determine what they found to be most helpful about the practice. Focus group discussions from William and Kaserwa's Tanzania study highlighted: the flexibility that WRS gives to farmers when they are able to sell their harvest at a good price; they have more time and flexibility for purchasing raw materials; and, storage is improved which reduces post-harvest losses. Also noted was the promotion of higher crop quality to attain a greater market value and greater price transparency for farmers who are participating. In Malawi, access to credit through WRS is reported by Edelman et al. to be considered one of its greatest advantages by warehouse operators.

In Burkina Faso, 75.8% of farmer groups that were interviewed reported that warrantage successfully met their goals (Yameogo & Guissou, 2014). They cited that it provided them with access to food during the *soudure* period, it enabled them to access credit, and it allowed them to combat poverty by conducting income-generating activities. Alternatively, 24.2% of farmer groups said that it did not meet their goals, reporting that there remained difficulties in accessing credit and that the prices they received for their crops did not make the practice profitable.

### **What can be learned from cereal bank successes and failures?**

Several reports on CBs discussed what was learned by comparing successful CBs with those that had failed. Many of these lessons can be applied to strengthening warrantage systems as well. Mwamfupe Davis (2014) looked at CBs in three Tanzanian villages, and Lawrence (1998) reported on characteristics that he identified as held in common by successful CBs based on his interviews with agencies who have promoted CBs over the years. Soumaila and Wada (2009) review CBs in Niger, and Eibisch (2015) examined four successful and three failed CBs in the Gambia. Here is what they determined to be important:

**Effective leadership of cereal banks.** Lawrence calls it “selfless, dynamic leaders”, and Davis refers to the importance of cereal bank leaders possessing business and management skills. He mentions how in some cases the community had selected leaders because they were “hardworking, trustful, and able to read and write”, but this does not always translate to efficient operations of a CB (p. 4). Soumaila and Wada say that high levels of illiteracy among CB managers was a problem faced in Niger, so leaders may benefit from having a certain level of education to be able to successfully manage the operations. Eibisch cites the ability of the community/political leaders to model good practices regarding use of the CB as being essential to ensuring CB users are not taking advantage of the system.

**Community buy-in and sense of ownership.** Davis says that support and commitment from the community for the presence of a CB is essential for it to be sustained. He found that in some villages there was what he called a “dependency attitude” toward donor assistance. In these cases, the CBs may have been established with seed money and initial cereals from NGOs and only required labor for construction from the community. This may have led communities

to feel that the CB did not belong to them and thus they were not responsible for its upkeep. Soumaila and Wada reported that CBs in Niger were perceived by some communities as emergency measures, as opposed to durable development solutions. Both of these views reduce communities' investment in sustaining the system.

**Not located in areas with highest food deficits or highest surpluses.** Both Davis and Lawrence say that CBs are hard to sustain in areas with very low crop yields, where there is not enough cereal to store in the bank or even to sustain the community in the immediate term. Lawrence also says that CBs are hard to operate in the poorest areas with chronic food deficits because of limited purchasing power and social pressure that is exerted to provide credit that may not be paid back. This can be relevant for warrantage operations as well, because in food deficit areas, farmers do not produce enough crops to be able to use any as collateral. And in high surplus areas, the market may be saturated; thus, prices may not rise enough to cover the costs of warrantage for farmers.

**Ability to hold people accountable.** Eibisch speaks to the importance of having collateral security (sometimes in the form of an agricultural tool) to ensure loan repayment. Also helpful is being capable of sanctioning those who do not make the repayments. He discusses the important role that peer pressure and gender appeared to play in the CB cases he studied, offering the example that in one of the villages, women were not required to provide collateral for their loans because the community had no doubt that women pay back their debts. Warrantage clearly addresses the challenge of collateral security that CBs face, so this is likely not an issue for the practice.

### **What can be learned from warrantage successes and failures?**

Several of the characteristics cited above for successful CB match with the learnings from an unsuccessful warrantage system in Zambia (Galtier & Vindel, 2012). Zambia Agricultural Commodities Agency (ZACA) implemented WRS (*warrantage détenteur*) via the Natural Resources Institute in 2001; in 2005 there were no cereal deposits by farmers, and management problems resulted in no data available for 2006. In 2007, ZACA was dismantled. The case study cites failure due to a variety of factors: poor management (common with the CBs described above), political constraints, lack of progression of laws, lack of regular demand, lack of engagement by key operating groups of ZACA and poorly targeted support from donors.

With Niger's *Projet Intrants*, the year 2003-2004 saw a dramatic decrease in the amount of credit extended (Coulter & Mahamadou, 2009). This was determined to be due to three factors: MFIs were lending too easily; credit was given out too late, sometimes in January, when the price of stock had already increased; and farmer groups were focusing primarily on buying back their produce with the loan money, as opposed to using the money for additional activities that could generate revenue.

Most of the studies that noted years in which warrantage was not profitable for farmers attribute it to insufficient price increases over the course of the season. While this is something that is difficult to address once the season is underway, it underlines the importance of making early strategic decisions about when and where to implement warrantage systems.

Several reports and studies have proposed conditions for success of warrantage. Annex 7 of Coulter's *Review of warehouse receipt system and inventory credit initiatives in Eastern & Southern Africa* (2009) provides a detailed list of prerequisites corresponding to various actors as well as issues to address regarding the policy and legal environment. Presentations from NGOs have summarized their own findings on what is necessary for a successful warrantage program (Boubacar, 2007; Traore, 2016) and they have also been documented in NGO reports (Chetaille et al., 2011). Seven conditions for success were drawn from the literature by this author and used to create a rubric to assist communities, NGOs and state actors in assessing where warrantage has the greatest chance of success (see Appendix C.) These conditions are:

1. Community is engaged and expresses interest in participating.
2. Farmers produce sufficient crop yields to participate.
3. Farmer cooperatives work together successfully.
4. Farmer group leaders possess the skills and education levels necessary to make warrantage profitable.
5. Adequate storage facilities are available for use.
6. Microfinance institutions are engaged as effective partners.
7. Market prices increase from harvest to *soudure* period.
8. Government policies allow a favorable environment for warrantage's success.

## Recommendations

The challenges, risks and successes of warrantage inform the recommendations that have been proposed in the literature. Reports by Oxfam and *Agence Française de Développement* have many recommendations that can be referenced further (Garrido & Sanchez, 2015; Le Magadoux et al., 2013). Some of the most common recommendations from the literature reviewed are cited here:

### **To expand the reach of warrantage to benefit more farmers:**

- Increase sensitization of smallholder farmers to heighten awareness of the practice and its potential benefits (Coulter, 2009; William & Kaserwa, 2015)
- Build trust among the community in the efficacy of the system (Bass & Henderson, 2000)
- Conduct feasibility studies and regional workshops to determine in which communities and regions the system could be effectively implemented (Höllinger et al., 2015)
- Secure financial support from the government to: help cover the costs of the initial investments (storage facilities, etc.); subsidize part of the cost of maintenance required to reach rural populations; and guarantee funds (Chetaille et al., 2011).

### **To ensure farmers achieve maximum profits:**

- Administer credit more quickly after the harvest, avoiding delays of several months (Ndimubandi, 2010)
- Increase the scale of operations to reduce the cost of monitoring warehouses (more pertinent to WRS than *warrantage paysan*) (Bass & Henderson, 2000)

- Renegotiate warrantage contracts between financial institutions and farmer groups to make it more profitable for both parties (Le Magadoux et al., 2013).

**To reduce risk of loan default:**

- Ensure appropriate product pricing by the MFI (Bass & Henderson, 2000; Coulter & Mahamadou, 2009).

**To support the sustainability of warrantage:**

- Instill greater sense of ownership among farmer groups for stronger medium and long-term relationships with financial institutions (Coulter, 2009)
- Create a payment system for farmer groups to cover the services they provide once products have been deposited, allowing them to initiate their own stock to create an operating fund (Le Magadoux et al., 2013)
- Provide technical assistance and implementation support to farmer groups and financial institutions (Höllinger et al., 2015; World Bank & IMF, 2010).

**To increase the capacity of farmers and farmer groups to take full advantage of warrantage:**

- Strengthen exchanges between farmer groups from different regions and countries to share local knowledge and best practices (Le Magadoux et al., 2013; Ndimubandi, 2010)
- Provide trainings on working in cooperatives groups, warrantage techniques and management (Chetaille et al., 2011; Le Magadoux et al., 2013; Ndimubandi, 2010)
- Develop adult literacy programs (Le Magadoux et al., 2013).

**To help participating farmers and farmer groups make more informed decisions to achieve greater profits:**

- Track reliable data on price trends and sales (Chetaille et al., 2011).

**To generate maximum support from governments for the practice:**

- Initiate a debate on the state's policies regarding the commercialization of agriculture and its impact on warrantage, and private activities in general (Coulter & Mahamadou, 2009; Yameogo & Guissou, 2014)
- Create a system to better target donor subsidies and projects regarding construction of warehouses, food security, and supporting farmer groups to the point where they can be most impactful (Coulter & Mahamadou, 2009).

**To facilitate greater opportunities for women to participate in warrantage, women in Le Magadoux et al.'s study suggested:**

- Allow women's farmer groups to be actively involved in the operation of warrantage
- Find solutions to the challenge of renting farmland
- Lighten the load of women's daily chores to allow them more time to farm (example of bringing in a mill)
- Reinstate literacy classes that are adapted to the age of participants and take into account women's domestic responsibilities.

## Conclusion

While many studies and reports have been produced about the practice of warrantage in Africa, there are still significant gaps in understanding the longer term implications of the practice for increasing food security in the Sahel. Findings that have been reported thus far are generally positive for the warrantage experiences that have been implemented, but they also state that warrantage is not a suitable practice for every location. Warrantage is often not accessible to the poorest farmers, and the literature shows that women participate less frequently than men.

There are valuable insights to be gained from reviewing the successes and failures of warrantage in various communities. These can be used to strengthen future efforts for expanding or deepening the practice in Niger and Burkina Faso, as well as evaluating whether communities feel that it is among the most effective interventions to meet their identified needs. There are also important questions that remain unanswered, which future research can help address.

## Limitations

This literature review acknowledges several limitations to its findings:

- There is limited research that reports on the perspectives of the community members who are engaged in the practice. Since they are the ones for whom these programs are designed, it is critical that their voices be central to any evaluation of its efficacy.
- This review does not include literature that is written in languages other than French or English, nor articles or reports that were not available online through publicly-searchable web engines or scholarly databases or sent to this author. Thus, the results from organizations that may be conducting the practice but are publishing in another language or that do not publish their findings online are not included.
- The quality of the data reported may vary among the literature included in this review given that not all evidence came from peer-reviewed journals; many of the reports were written by institutions that are funding these programs, so their reports may be biased.
- While this author attempted to view the available research from a neutral perspective, her own biases should also be acknowledged.

## Recommendations for future research

Future research can enhance our understanding of warrantage by prioritizing community's perspectives on warrantage in relation to other practices to determine how it aligns with communities' objectives and goals. It can also better hone variations of the practice to different contexts to ensure maximum success where it is implemented. Application of participatory action research (PAR) or community-based participatory research (CBPR) approaches to warrantage could contribute significantly to the knowledge base on this intervention through its greater implication of community members in the process; this author did not find any reports explicitly using these approaches to evaluate warrantage. However, PAR has been used with smallholder farmers in looking at adaptation to climate change in Ghana and Zimbabwe (Mapfumo, Adjei-Nsiah, Mtambanengwe, Chikowo, & Giller, 2013).

Recommendations for research approaches to assess warrantage:

- More **participatory evaluations** where community members are integral partners in evaluating and reporting on the practice and their voices are at the forefront.

- Qualitative research that looks beyond the direct financial outputs of warrantage programs to **how those financial outputs translate into impacts on the household's wellbeing/food security** (one approach might be using a social return on investment (SROI) methodology such as that used by Weston, Hong, Kaboré, and Kull (2015) in their assessment of farmer-based natural regeneration in Ghana. The advantages of an SROI approach include its participatory nature as well as ability to measure the non-monetary benefits associated with an activity (Brouwers, Prins, & Salverda, 2010).)

Recommendations for future research:

- Randomized-controlled trials comparing the impact of **warrantage paysan versus warrantage détenteur/WRS**.
- Comparison of the impact of state-regulated warrantage systems versus locally-managed and controlled systems.
- **Cost-benefit analysis** of warrantage versus other interventions designed to increase resilience in the same communities.
- An exploration of the relationship between **warrantage and food sovereignty** (not just food security).

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## Appendices

### Appendix A – Table of scientific literature and expert opinions reviewed

Author	Date	Peer-reviewed?	Location	Term used	What it measures or assesses
Coulter	1993	Yes	Mali	"pledging system" w/ warehouse operator	[describes Mali's experience using different financing mechanisms for the cereal trade]
Abdoulaye & Sanders	2003	No	Niger	warrantage/ inventory credit	effects of higher output prices on adoption of improved Fertilizer Based Technologies (FBT); income effects of different agricultural policies, including warrantage
Fraslin	2005	No	Madagascar	village community granary	loans dispersed & repaid; profit to farmers
Abdoulaye & Sanders	2006	Yes	Niger	inventory credit	farmers' adoption of new technologies with higher fertilization rates and effects of new marketing strategies and public policy changes on farmers incomes and technology adoption (uses farm level programming model)
Baquedano & Sanders	2006	Yes	Niger	inventory credit	impact on farmers' income and adoption of farm-level technology (compares an inventory credit program in Western Niger that seeks to generate savings for farmer groups for the purpose of purchasing inorganic fertilizers to a traditional ICP that gives credit at harvest but allows farmers to sell their grain after grain prices have recovered)
Konlambigue	2007	No	Northern Togo	inventory credit	price volatility in Northern Togo (uses modeling for forecasting)
Coulter	2009	No	E. & S. Africa	WRS	volume of crops stored; credit awarded; profit to farmers
Coulter & Mahamadou	2009	No	Niger	warrantage paysan	# participating farmer groups; credit amounts awarded by MFIs; cost-benefit analysis of millet & niébé in two markets
Ndimubandi	2010	No	Burundi	warrantage	net profit; credit access
Adamu & Chianu	2011	Yes	Nigeria	warrantage	market price trends; size of annual crop yields; sources of income; awareness of warrantage; cost-benefit analysis of warrantage
Madulu	2011	No	Tanzania	WRS	determinants of access to credit; characteristics of WRS-users
Onumah & Acquah	2011	Yes	Ghana	inventory credit	breadth and depth of outreach, measured by % of women participating in warrantage and size of loans; operational and financial sustainability using financial ratios; adjusted return on equity and adjusted return on assets
Saqualli et al.	2011	Yes	Niger	inventory credit	individual's decision-making behavior re: increasing use of organic fertilizers and inventory credit (using agent-based modeling)
Tabo et al.	2011	Yes	W. Africa	warrantage	net profit
Egah et al.	2014	Yes	Benin	warrantage	growth rate of # of warranted product depositors
Jovicic et al.	2014	Yes	Serbia	WRS	WRS's impact on risk reduction in cereal production
Hollinger, Rutten & Kiriakov	2015	No	E. Europe & Central Asia	WRS	[discusses current status of warehouse receipt financing in Eastern Europe and Central Asia and ways to improve it]
William & Kaserwa	2015	Yes	Tanzania	WRS	determinants for choosing WRS (using a regression analysis)

## Appendix B – Table of additional reports reviewed that included measurement or discussion of impact<sup>2</sup>

Source (author)	Date	Document Type	Location	Term used	What it measures or assesses
Kwadzo, George (as cited by Bass & Henderson)	2000	Technical note	West Africa	WRS	profit to farmers
IFPRI (Pender et al.)	2008	NGO discussion paper	Niger	inventory credit	awareness of inventory credit, credit received, characteristics of inventory credit users & non-users
Afrique Verte	2010	NGO Report	Burkina Faso, Mali and Niger	warrantage	price trend analysis
Agence Francaise de Developpement (Chetaille et al.)	2011	NGO report	Tanzania & Kenya	warrantage	profit to farmers & farmer groups
IFC	2012	IFI report		WRS	[includes brief case studies]
FAO (Le Magadoux et al.)	2013	UN report	Niger	warrantage	[case study on Cigaba Union's implementation of warrantage]
Government of Burkina Faso (Yameogo & Guissou)	2014	Government report	Burkina Faso	warrantage	change in warrantage participation & credit granted over time; impact of how public stock is managed on changes in warrantee's quantities, stock management expenses, and sale prices
IFPRI (Edelman et al.)	2015	NGO working paper	Malawi	WRS	maize production rates, market price data, cost-benefit analysis
Oxfam (Garrido & Sanchez)	2015	NGO report	Burkina Faso	warrantage paysan	scenario-building of cost-benefit analysis for four different scenarios with different interest rates & credit %s provided for four different crops

<sup>2</sup> Reports in this table were not peer-reviewed or published in scientific journals.

**Appendix C – Rubric for assessing conditions for warrantage’s success<sup>3</sup>:**

Conditions for success:	N/A 0	Beginning/Not ready 1	Developing 2	Ready 3	Advanced 4	Score
<b>Community level</b>						
<b>#1 Community is engaged &amp; expresses interest in participating</b>		The community has not yet discussed whether or not they are interested in the practicing warrantage	Community members have expressed interest, but there is little demonstrated commitment to investing the necessary time and resources	The community has proactively requested a warrantage program and leaders have been identified by the community who have demonstrated their commitment to investing in initiating the practice	The community has already experimented with warrantage and found it to be successful enough that they wish to continue it	
<b>#2 Farmers produce sufficient crop yields to participate*</b>		Most farmers produce just enough to meet their families’ short-term needs each year and do not have anything left over to sell or store	A few farmers sell some of their crops immediately after their harvest that could instead be stored in a warrantage scheme	Many farmers sell some of their crops immediately after the harvest that could be stored in a warrantage scheme	Farmers regularly produce enough crops each year to be able to store at least a small portion in a warrantage scheme	
<b>#3 Farmer cooperatives work together successfully</b>		There are few, if any, active farmer groups in the region, though there is willingness to form them	There are existing farmer groups in the community that are interested in practicing warrantage	Farmer groups are managed by effective leaders and group members collaborate well together	Members of farmer groups successfully employ democratic principles for decision-making and conflict-resolution and the leadership facilitates the achievement of positive benefits for all members	
<b>#4 Farmer group leaders possess the skills &amp; education levels necessary to make warrantage profitable</b>		Leaders are unfamiliar with warrantage and managing credit, but are interested and willing to participate in trainings	Leaders are being trained or have been trained, and some have mastered the concepts	Leaders have mastered the concepts related to warrantage and credit-management, and are able to train their group members as well	In addition to the “ready” level, leaders can advise members on conducting profitable IGAs and can interface effectively with MFIs to advocate on behalf of their group	

<sup>3</sup> This tool was created to assist communities, development agencies, and government actors in determining the viability of warrantage as a means of increasing resilience in a particular community. This rubric is not meant to be used as a scientific measure to predict whether or not warrantage can succeed, but rather to encourage a thorough and thoughtful assessment of the opportunities and challenges that may be present in a particular location before initiating a warrantage program. Not all conditions necessarily have equal weight (for example, condition #1 should be seen as an prerequisite out of respect for community autonomy, but #3 is something that could be achieved/improved over time). The conditions of success were identified based on findings from the literature review completed by The OASIS Initiative for SAREL.

Conditions for success:	N/A 0	Beginning/Not ready 1	Developing 2	Ready 3	Advanced 4	Score
<b>#5 Adequate storage facilities are available for use</b>		There are insufficient existing storage facilities, but there is vested interest in renovating or building new facilities	Storage facilities have sufficient space but are not safe and protected, or vice versa. They may also be difficult for farmers to access due to distance	Storage facilities meet minimum standards and while distance may be inconvenient, it not far enough away to deter most farmers from participating	Storage facilities: are secure against theft, water damage and pests; have sufficient space; and are easily accessible to all farmers	
<b>Regional level</b>						
<b>#6. Microfinance institutions are engaged as effective partners</b>		No MFIs are currently operating in the region, but negotiations are in progress or there are prospects	There are MFIs in the region that serve the community, but they are not currently implementing warrantage	MFIs have partnered with the community to practice warrantage	MFIs have advanced proficiency in warrantage schemes, provide responsible credit amounts to depositors, and advise participants on effective loan management	
<b>#7. Market prices increase from harvest to soudure period*</b>		Historically there has been minimal price increases during a minority of years	Price increases happen during most years but they are less than 10%, or they fluctuate unpredictably	Price increases happen during a majority of years at a minimum rate of increase of 20% (or slightly more than whatever % is calculated as the threshold at which farmers would break even between profits and warrantage fees)	Price increases happen every year at a rate over 30% (or significantly more than whatever % is calculated as the threshold at which farmers would break even between profits and warrantage fees)	
<b>National level</b>						
<b>#8 Government policies allow a favorable environment for warrantage's success</b>		In the current policy environment, the govt. has used external food aid or their own grain reserves to mitigate food insecurity, which has rendered prices highly unpredictable	Govt. policies or action have a small but apparent impact on increasing price unpredictability; or, govt. is amenable to exploring its policies' impacts on warrantage to make possible policy changes	Governments have recently shifted or are in the process of changing policies that negatively impact the success of warrantage	Government action or policy has not or does not impact seasonal price changes of the products farmers use in warrantage	

\*Conditions #2 and #7 are the bare minimum that must be met for warrantage to increase farmers' income through sales of their crops. If condition #2 is not met, then warrantage is not possible for farmers. If condition #7 is not met, then farmers will either not generate a profit from selling their crops later in the season, or they will lose money doing so. However, given that profits from crop sales is not the only reported benefit of warrantage, this condition should be weighed against the other reported benefits, such as the ability to conduct income-generating activities using credit, having access to food throughout the year, etc.