

# AgResults Senegal Crop Storage Finance Challenge Project

Process Tracing Evaluation – Baseline

August 2022

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### **Acknowledgements**

This work is funded by the Foreign, Commonwealth & Development Office with the assistance from the Bill & Melinda Gates Foundation. We would like to thank Alan Tollervey, Andrew Shaw, Gillian Roberts, Richard Caldwell and the entire Steering Committee for their support and collaboration. We would also like to thank the Organe de Régulation du Système de Récipissé d'Entrepôt de marchandises du Sénégal, Connexus, and Deloitte teams for their hands-on assistance throughout our evaluation activities. We specifically would like to thank Rodrigo Ortiz and Krystal Chindori- Chininga for their review and comments on this report. Finally, this work would not have been possible without the contributions of our respondents who shared their experience and expertise on the storage and agriculture sectors in Senegal. We hope that the findings and recommendations provided in this report offer constructive opportunities to build and improve on the project's existing progress.

### **Disclaimer**

Findings presented in this report are based on data gathered between April and June 2022, towards the beginning of project implementation. The report therefore reflects the state of the project and the viewpoints of project stakeholders at the time of the report's conception – our findings do not necessarily reflect the future ambitions and intentions of the project implementers.

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## Acronyms and abbreviations

AFD	Agence Française de Développement
ANSD	Agence Nationale de la Statistique et de la Démographie
BICIS	Banque Internationale pour le Commerce et l'Industrie du Sénégal
BMGF	Bill and Melinda Gates Foundation
BSIC	Banque Sahélo-Saharienne pour l'Investissement et le Commerce
CM	Collateral Manager
CNFA	Cultivating New Frontiers in Agriculture
EGF	Entreposage et Garantie Financière
EDD	Evaluation Design Document
IE	Impact Evaluation
IFC	International Finance Corporation
KII	Key Informant Interviews
LBA	La Banque Agricole
ORSRE	Organe de Régulation du Système de Récépissé d'Entrepôt de marchandises au Sénégal
PAMECAS	Partenariat pour la Mobilisation de l'Épargne et le Crédit Au Sénégal
PO	Producer Organization
PT	Process Tracing
SHF	Smallholder Farmers
URMECS	Union Rurale des Mutuelles d'Épargne et de Crédit du Sénégal
USAID	United States Agency for International Development
WRS	Warehouse Receipt System

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# Executive Summary

This report documents our findings from IDinsight’s baseline Process Tracing evaluation of the AgResults Senegal Crop Storage Finance Challenge project (“AgResults Crop Finance project”). This project is a 5-year, \$6.8 million prize competition whose goal is to encourage a collection of actors (financial institutions, warehouse operators, and collateral managers) to upgrade warehouse infrastructure and support nascent storage-based finance schemes, specifically a Warehouse Receipt System (WRS). IDinsight is the external evaluator for the project.

The purpose of the baseline Process Tracing evaluation was to assess the state of the storage finance market during early stages of the project and assess if the preconditions are in place for the project to have its intended impact. We conducted qualitative interviews with a total 57 stakeholders, including warehouse operators, collateral managers, value chain actors, financial institutions, and storage experts. Based on these interviews, we identify evidence regarding the potential achievement of project goals, and structure this evidence around the Evaluation Questions adapted from the AgResults evaluation framework. We also provide a descriptive analysis of the competition’s design and implementation, suggesting recommendations for how to improve implementation moving forward. The tables below summarize our high-level findings and recommendations for the competition.

*Table 1: Executive summary of findings*

Project goal	Expected outcome	Rationale
The competition will encourage the development and upgrading of warehouse storage facilities (EQ 1a)	Goal is <b>not likely</b> to be achieved.	Provisionally licensed warehouse operators did not need to invest in upgrades or new equipment to get licensed and/or participate in the competition. So long as the competition and the government regulatory body continue collaborating with warehouses that already meet certification standards, and/or do not clearly communicate to potential competitors the upgrades that are needed to satisfy licensing norms, AgResults will likely not induce storage facility upgrades.
The competition will encourage the professionalization of storage in Senegal (EQ 1b)	Goal is <b>likely</b> to be achieved.	The competition currently requires warehouse operators to work with a Collateral Manager (CM) <sup>1</sup> , leading to more widespread use of professionalized storage practices. As a result, it appears likely that the competition will help professionalize the storage sector in Senegal through the increased involvement of the partner CM. Despite this, additional avenues to storage professionalization, such as the transfer of storage management expertise to non-CM storage actors (e.g. producer organizations) or the induction of new CM into the market, do not seem as feasible at this stage.
The competition will encourage warehouse operators to better understand smallholder needs and offer better services to smallholders accordingly (EQ 1c + 1d)	It is <b>unclear</b> if the goal will be achieved.	Warehouse operators seemed aware of smallholder constraints, notably in terms of accessing warehouses, but mentioned that they have so far been unable to meet these needs due to a lack of funding. If the competition induces warehouse operators to use the WRS, and operator revenues increase as a result (for storage models that accumulate revenues at the operator-level), operators may be able (and decide) to invest this new revenue in improved storage-related services for smallholder farmers (SHF).

<sup>1</sup> This is a requirement of participation in the WRS by the Organe de Régulation du Système de Récépissé d’Entrepôt de marchandises au Sénégal (government regulatory body for the WRS).

Project goal	Expected outcome	Rationale
The competition will encourage the banking sector to participate in the WRS (EQ 1e)	Goal is <i>likely</i> to be achieved.	Financial institutions (FI) expressed clear interest in the competition and plan to allocate relatively high credit amounts through the WRS. However, it is less certain that FI will be able to participate in an effective and timely manner, given existing problems with accepting and processing warehouse receipts.
The competition will encourage warehouse operators to participate in the WRS (EQ 1f)	It is <i>unclear</i> if the goal will be achieved.	The competition's ability to induce participation in the WRS is largely contingent on warehouse operators and smallholders' trust in the system. If the competition is able to increase revenues for operators and address some of the WRS challenges (e.g. high CM fees, SHF lack of awareness, implementation failures), the competition will likely be successful in encouraging participation in the WRS. However, if these challenges persist, WRS take-up may stagnate. Until operators have experimented further with the system and the competition, it is difficult to know if the competition will be able to achieve this goal.
The competition will directly increase SHF revenues (EQ 3a)	It is <i>unclear</i> if the goal will be achieved.	Warehouse operators used a range of storage models, including models that were unlikely to benefit SHF directly (though they may have indirect benefits in the long term), and models that could benefit SHF directly. While a well-functioning Warehouse Receipt System (WRS) has the potential to unlock storage opportunities for credit-constrained smallholders, there are many barriers to smallholders storing, and it is unclear if the competition will be able to relax all of them. As a result, the competition looks most likely to benefit the warehouse operators, and any benefits to SHF will be indirect.
Crop prices generally increase between harvest and non-harvest seasons and this mechanism will sustain in the medium to long term in Senegal (EQ 4e)	Goal is <i>likely</i> to be achieved.	Price analyses and interview data from across stakeholders offer some evidence that crop prices across value chains generally increase between harvest and non-harvest seasons. Given the current scale and ambition of the 5-year competition, we think the competition is unlikely to induce so much storage that it noticeably reduces the variation in prices. However, price changes do not occur in a predictable manner across value chains and years, implying some risk to storage for SHF.

Table 2: Executive summary of recommendations for competition implementation

Recommendations on competition implementation
<ul style="list-style-type: none"> <li>• <b>Implement transparent and well-communicated selection criteria</b>, such that potential competitors understand if they are eligible, and all eligible warehouses have the opportunity to join the competition.</li> <li>• <b>Partner with numerous stakeholders</b> (e.g. FI and CM) through the competition to avoid unnecessary exclusion of potential competitors based on partner practices, such as: <ul style="list-style-type: none"> <li>○ FI refuses to approve financing for warehouse,</li> <li>○ CM offers monopolistic pricing to warehouse.</li> </ul> </li> <li>• <b>Collaborate more closely with the ORSRE</b> (government regulatory body) to address their concerns with the competition as much as possible given their vital role in licensing potential competitors.</li> <li>• <b>Continue targeting female warehouse operators through the EOI and selection processes</b> to ensure better gender balance between competitors.</li> </ul>

# 1. Introduction

## 1.1 Project overview

AgResults is a \$152 million initiative that incentivizes the private sector to address market failures in agricultural systems through pay-for-results schemes. AgResults aims to deliver potential solutions to these market gaps that could ultimately bring about meaningful improvements in smallholder farmers' livelihoods.

The AgResults Crop Finance project in Senegal was designed and implemented based on the observation that smallholder farmers face difficulties maximizing their harvest income due to storage and finance challenges. The project aims to address these challenges through the supported scale-up of the nascent warehouse receipt system (WRS) in Senegal. In theory, this system allows SHF to store their crops in good quality and well managed warehouses, receive financing during the harvest season by using their stored crops as collateral – typically under the supervision of a CM – and take advantage of higher prices in the lean season to increase their income earned on crop sales. The project hopes to take advantage of the development of the regulatory environment around WRS – notably the recent creation by the Senegalese government of the *Organe de Régulation du Système de Récépissé d'Entrepôt de marchandises au Sénégal (ORSRE)*, the regulatory body in charge of developing and overseeing the WRS.

The competition is thus designed to incentivize participation in the WRS through two prizes. The Phase 1 prize awards competitors (warehouse operators) for upgrading their warehouses to achieve quality standards so that financial institutions are willing to lend against crops stored in warehouses and the regulatory body is able to provide licensing. The size of the Phase 1 prize is \$4,000/ \$6,000, based on size of licensed storage facility. The Phase 2 prize encourages competitors to participate in the WRS by providing an additional financial incentive worth 5% of the total sale value of crops stored through the WRS. Together, these prize structures are designed to improve storage quality standards and enable broader participation in the WRS in Senegal.

The execution of all project components is divided between partners. The Secretariat is responsible for the design of the competition, and for the coordination/supervision of all project-related activities. The Project Manager (PM) is responsible for administrative, coordination, and technical tasks in Senegal, including outreach to competitors to encourage participation, coordination of application reviews, and reporting on program progress to the Secretariat. The Verifier ensures that WRS licenses and expressions of storage intent are legitimate, and audits warehouse crop storage. The Evaluator is responsible for estimating the impact of the project on SHF and other storage sector actors.

## 1.2 Report overview

As the evaluation partner for the AgResults Crop Finance project in Senegal, IDinsight conducted a baseline Process Tracing evaluation (see Section 2.1 for more information on the process tracing approach) to better understand the competition's progress up to date vis-à-vis its goals as defined by our evaluation questions. This report investigates the extent to which the competition has advanced towards achieving those goals (or not) and offer insights into how to improve competition implementation moving forward, based on data collected between April and June 2022 towards the beginning of project implementation.

To measure progress towards these goals, we structure our findings around the Evaluation Questions (EQ) adapted from the AgResults evaluation framework. We supply evidence for and against the project goal for each relevant EQ, and outline our expected outcome for each goal based on the evidence available at that stage of project implementation and within the current WRS environment in Senegal. We also provide a descriptive analysis of the current storage practices used by warehouse operators, and examine the effects of competition design and implementation. As the competition advances, we aim to conduct follow-up Process Tracing evaluations to gather further evidence on the competition’s progress towards its goals.

## 1.3 Background

### 1.3.1 AgResults launch and preselection process

The AgResults Senegal Crop Finance project officially launched in Senegal in November 2021. Since then, the PM has guided the competition through various phases. First, the PM launched an expression of interest for warehouse operators<sup>2</sup> to apply for the competition. Of the 186 operators who replied to the initial expression of interest, 64 provided further information relevant to their participation in the Warehouse Receipt System (WRS), such as storage capacity and distance to the closest local market. Based on this information, the PM conducted outreach activities in the groundnut value chain and a preselection process in late December 2021 whereby it identified 17 groundnut warehouses for the initial stage of the competition. The criteria considered for preselection included warehouse size, proximity to local markets, and the expected capacity of applicants to be successful in the WRS scheme.<sup>3</sup> The PM coordinated with the competition’s partner financial institution (FI) – La Banque Agricole (LBA) – to vet these warehouses. The PM also required collateral managers to finalize contracts with producer organizations (PO) and the private non-PO owners of these warehouses by December 27, 2021.<sup>4</sup>

As the preselection of the 17 warehouses was taking place, the ORSRE was concurrently in the process of provisionally licensing groundnut warehouses for its groundnut pilot (see Section 1.3.2). To officially be able to participate in the WRS, the 17 preselected warehouses needed official licensing from the government regulatory body. Through its pilot, the ORSRE provided provisional licensing to only 3 of the 17 preselected warehouse operators identified by the PM. Due to this limited licensing of preselected warehouses and the conclusion of the groundnut harvest season, the PM (alongside the Secretariat) decided to postpone the participation of groundnut warehouse in the competition in March 2022 until the ORSRE licensing process was no longer provisional and could certify the 17 preselected groundnut warehouses (expected for July or August 2022).<sup>5</sup>

Beginning in March 2022, the PM focused efforts on the cashew value chain during the time when the ORSRE was launching its cashew pilot. As with groundnut, the PM conducted outreach to potential

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<sup>2</sup> We define warehouse operators as the primary points of contact for each warehouse, who are typically responsible for coordination and communication with the ORSRE, the Collateral Manager if any, and the PM.

<sup>3</sup> These criteria are taken directly from the PM and Secretariat’s Steering Committee presentation in March 2022 and confirmed through discussions with the PM directly. However, the exact details of how these criteria were deployed, and their precise definition (e.g. “capacity of applicants to be successful in the WRS scheme”) have remained unclear (see Section 4).

<sup>4</sup> Given that LBA was the sole creditor for the competition’s provisional WRS scheme, the PM asked the bank to confirm the list of preselected warehouses so that the PM would exclude any warehouse from the competition that the LBA was not willing to finance.

<sup>5</sup> If the ORSRE licensing process is still not operational by July or August 2022, the PM has planned to proceed with an interim (alternative) verification process for the preselected groundnut warehouses. Once the licensing system is determined, the PM will pass from the preselection to the selection of warehouses (dependent on operators providing the necessary documentation for selection and passing the verification process).

competitors in the cashew value chain to encourage their application to the competition. Given that warehouse operators participating in the WRS have been required by the ORSRE to sign agreements with Collateral Managers (CM), the PM coordinated with warehouse operators and CM to facilitate the signing of agreements between both parties. Out of the three CM that participated in the ORSRE cashew pilot, the PM collaborated with Ace Global through the competition. This is due to the fact that Ace Global managed all PO-owned warehouses in the pilot, while the other two CM, EGF and Procontrolle, only managed private non-PO owned warehouses. As opposed to the process for the preselection of groundnut warehouses, the PM waited for the ORSRE to conclude its provisional licensing process through the WRS cashew pilot (see Section 1.3.2). Out of the 20 cashew warehouses provided with provisional licenses, the PM selected 9 cashew warehouses for the competition in May 2022. Regarding the criteria for preselection, in addition to the criteria already used previously, the PM prioritized warehouse operators that were producer organizations (rather than private non-PO storage actors) and excluded two warehouse operators from selection due to a lack of documentation provided.<sup>6</sup> Selected warehouse operators are expected to receive the Phase 1 prize (upon Grant Thornton's<sup>7</sup> verification of warehouses) and begin storage through Phase 2 shortly.

Regarding the competition's prize structure, the PM has been in conversation with different stakeholders (e.g. CM, Secretariat, warehouse operators) to confirm the distribution of Phase 1 and Phase 2 prizes. Discussions have focused on whether to (partially) distribute prize amounts to CM given that they have fronted certain costs relating to their involvement in the competition (e.g. reaching agreements with warehouse operators) and that they have been the primary actors responsible for applying to the competition. As of July 2022, the PM (in coordination with the Secretariat) is planning to allocate 100% of the Phase 1 prize to warehouse operators.

### 1.3.2 WRS pilots

Since its official inauguration in September 2021, ORSRE has launched two WRS pilots in Senegal across two value chains: groundnut and cashew. The government regulatory body has signed partnership agreements with a number of FI (i.e. LBA, PAMECAS, Orabank, BSIC), collateral managers (i.e. Ace Global, Procontrolle and EGF), and warehouse operators (i.e. producer organizations and non-PO storage actors) to launch and execute these pilots. The pilots have provided provisional licensing to participating warehouses for a duration of 6 months, requiring warehouse operators to reapply for ORSRE licensing the subsequent harvest season.

Beginning in January 2022, the ORSRE officially launched the WRS groundnut pilot, providing provisional licensing to 34 groundnut warehouses. The ORSRE required each of these warehouses to work with a CM in order to participate, and both Ace Global and Procontrolle signed agreements to manage participating warehouses. Furthermore, ORSRE hired Ace Global to evaluate warehouse conditions and run the provisional licensing process on their behalf.<sup>8</sup> Due to a number of implementation challenges with the pilot (see Section 3.6), storage take-up for warehouses participating in the WRS groundnut pilot was lower than expected.

In April 2022, ORSRE provided provisional licensing to 20 warehouses as part of its WRS cashew pilot. This time around, warehouse operators contracted with Ace Global, Procontrolle or EGF (ORSRE assigned CM

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<sup>6</sup> The PM cited that these two warehouse operators did not provide the following documentation required for participation in the competition: participation application form, proof of warehouse ownership or rental agreement, and contract agreement with Ace Global.

<sup>7</sup> Grant Thornton has been contracted as the verifier for warehouses as part of the AgResults competition in Senegal.

<sup>8</sup> We understand the regulatory body has not directly paid Ace Global for these services, but instead Ace Global has been compensated through its participation in the WRS pilot – specifically, the CM has charged warehouse operators a fixed price per ton stored per crop (with the crop price being agreed with ORSRE).

to certain warehouses based on CM experience and expertise). Moreover, Ace Global was tasked with conducting inspection reports for the cashew warehouses included in the pilot. Implementation challenges in the cashew pilot (see Section 3.6) have limited storage take-up among participating warehouse operators so far. The WRS cashew pilot is expected to conclude at the end of the harvest season for cashew nut in August.

## 2. Methodology

### 2.1 Process tracing approach

Our qualitative data collection follows the Process Tracing (PT) approach explained in our evaluation design (see Section 6.1).<sup>9</sup> Namely, PT describes an evaluation approach that aims to make descriptive and causal inferences through measuring change over time in key outcomes and “evidence” that would favor (or refute) each of several potential causal pathways. For this report, we investigate the causal claims (or goals) of the AgResults Senegal Crop Finance project and analyze the project’s direct and indirect effects descriptively.

Our PT approach focuses on the project goals tied to three Evaluation Questions: EQ1, EQ3 and EQ4.<sup>10</sup> EQ1 looks into the competition’s impact on private sector involvement in the warehouse sector, EQ3 investigates the competition’s impact on gross and net SHF income, and EQ4 examines the scalability and sustainability of the competition’s effects. There are three lenses through which we examine EQ over the course of our evaluation: causal, descriptive, and prospective. For the purposes of this baseline study, we will focus on the causal and descriptive lenses in order to begin collecting evidence on the project’s progress towards its own stated goals and on the influence of other contextual factors that are not directly project related. The prospective lens focuses on understanding the likelihood of project effects after the conclusion of the competition and is therefore not as relevant at baseline. In addition to analysis of our EQ, we provide a descriptive analysis of storage models used by warehouse operators and look at the competition’s design and implementation at baseline.

### 2.2 Data collection

We collected qualitative and quantitative data through semi-structured individual Key Informant Interviews (KII) on a range of actors involved in the storage and WRS sectors from April to June 2022.<sup>11</sup> For each interview, we took and compiled detailed notes, in addition to recording interviews where consent was provided. Our team conducted the majority of these interviews in French, and in certain cases, mobilized trained enumerators to conduct and document interviews in Wolof. Our sampling for KII focused on actors relevant to the storage sector and the WRS more generally. We conducted interviews

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<sup>9</sup> Our Evaluation Design Document (EDD) explains our evaluation design for the AgResults competition in detail and can be shared upon request.

<sup>10</sup> EQ2 is focused on the impact of the competition on SHF uptake of storage and collateral based finance, and will be addressed primarily through our Impact Evaluation at the SHF-level.

<sup>11</sup> Prior to the launch of our official KII, our team conducted scoping activities with a range of actors to better understand the stakeholder landscape and help guide our evaluation design.

with crop storage actors (including producer organizations and private non-PO actors<sup>12</sup>), financial institutions (including microfinance institutions and banks), the regulatory body (ORSRE) public sector actors, AgResults-affiliated entities (e.g. members of the Steering Committee) and technical experts. The table below breaks down the KII completed with a range of actors at baseline.

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<sup>12</sup> “Private non-PO actors” refer to warehouse operators that are not producer organizations, but instead are private sector actors who own or operate warehouses for their own profit. They may purchase crops from SHF or PO directly.

Table 3: Stakeholder groups and number of interviews conducted for KII at baseline

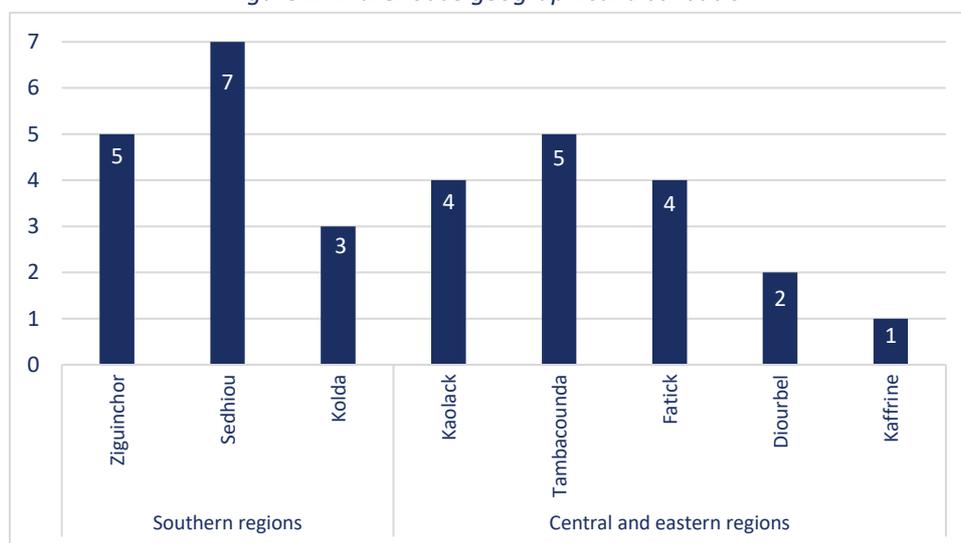
Stakeholder Group	Stakeholder sub-group	Entity	Number of interviews at baseline
Crop storage actors	Collateral warehouse managers	<ul style="list-style-type: none"> <li>Collateral warehouse managers that have been involved in operating the WRS in Senegal, namely Ace Global, and Procontrole</li> </ul>	2 interviews
	Warehouse operators	<ul style="list-style-type: none"> <li>22 warehouse operators (PO and non-PO) that have been (pre)selected by the PM</li> <li>17 warehouse operators (PO and non-PO) that have been licensed by the ORSRE (out of which 11 were (pre)selected by the PM)</li> <li>3 warehouse operators (PO) that have not been (pre)selected by the PM nor licensed by the ORSRE</li> </ul>	31 interviews <sup>13</sup>
	Value chain actors	<ul style="list-style-type: none"> <li>2 crop processing and exporting actors</li> <li>4 local traders acting as middlemen between SHF/PO and large commodity buyers</li> </ul>	6 interviews
Government actors	Regulatory body	<ul style="list-style-type: none"> <li>Representative from Organe de Régulation du Système de Récépissé d'Entrepôt de marchandises au Sénégal (ORSRE)</li> </ul>	1 interview
	Ministry of Commerce	<ul style="list-style-type: none"> <li>Representative from the Ministère du Commerce et des Petites et Moyennes Entreprises</li> </ul>	1 interview
AgResults-affiliated entities	AgResults internal stakeholders	<ul style="list-style-type: none"> <li>Representatives from AgResults Steering Committee members</li> <li>Representative from the AgResults Secretariat</li> <li>Representative from the competition's Project Manager (Connexus)</li> </ul>	5 interviews
Financial Institutions	Banks	<ul style="list-style-type: none"> <li>Representatives from participating banks/microfinance institutions including: <ul style="list-style-type: none"> <li>Partenariat pour la Mobilisation de l'Épargne et le Crédit Au Sénégal (PAMECAS),</li> <li>Banque Sahélo-Saharienne pour l'Investissement et le Commerce (BSIC),</li> <li>Orabank,</li> <li>La Banque Agricole (LBA).<sup>14</sup></li> </ul> </li> <li>Representatives from banks/microfinance institutions that have not yet participated in the WRS, including: <ul style="list-style-type: none"> <li>Banque Internationale pour le Commerce et l'Industrie du Sénégal (BICIS),</li> <li>Union Rurale Des Mutuelles d'Épargne Et De Crédit Du Sénégal (URMECS).</li> </ul> </li> </ul>	6 interviews
Technical experts	Technical experts/donors involved in similar projects	<ul style="list-style-type: none"> <li>Representative from the International Finance Corporation (IFC)</li> <li>Representative from United States Agency for International Development (USAID)</li> <li>Representative from Cultivating New Frontiers in Agriculture (CNFA)</li> <li>Representative from Agence Française de Développement (AFD)</li> <li>Representative from Shelter for Life (non-profit)</li> </ul>	5 interviews
<b>Total interviews</b>			<b>57 interviews</b>

<sup>13</sup> 11 warehouse operators were both (pre)selected by the PM and licensed by the ORSRE, hence the total number of warehouse operator types indicated in the "entity" column is greater than the number of individual interviews conducted. Of the 31 warehouse operators, two groundnut operators were surveyed during scoping activities prior to the launch of the PT but were included in our baseline since they were preselected by the PM.

<sup>14</sup> Our interview with LBA was conducted as part of scoping activities, and therefore not included in our analysis of certain indicators (e.g. total loan amount committed to upcoming harvest season through non-WRS loans).

In terms of crop storage actors, the warehouse operators we have spoken to are predominantly producer organizations (25) with some private non-PO actors included (6). Warehouse operators surveyed managed storage facilities located in the south (i.e. Ziguinchor, Kolda and Sedhiou) – a region traditionally involved in cashew nut production – as well as in the central and eastern regions known as the “groundnut basin” (i.e. Kaolack, Tambacounda, Fatick, Diourbel, and Kaffrine) (see Figure 1).

Figure 1: Warehouse geographical distribution



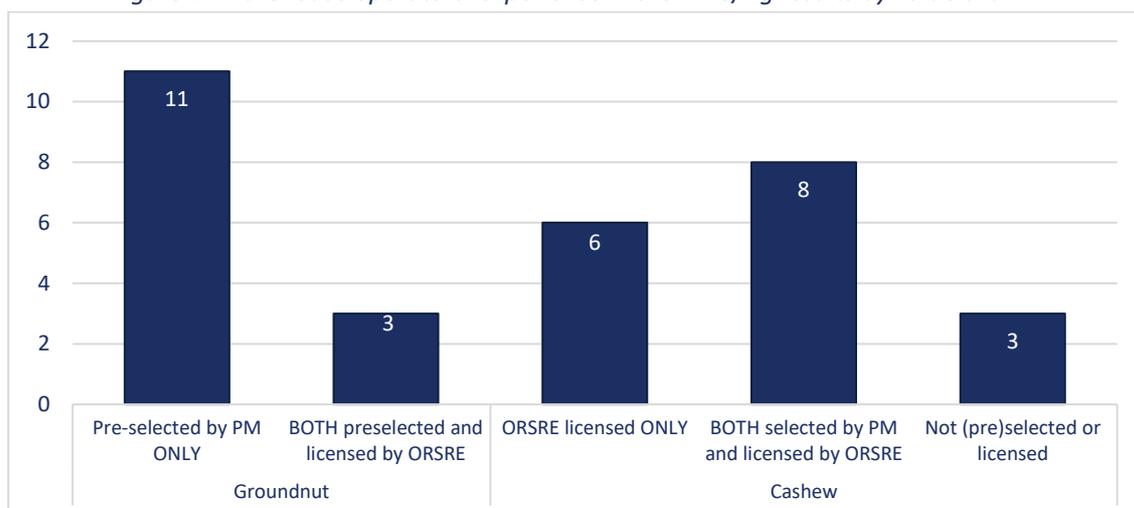
In addition, our sample selection of warehouse operators has targeted those that have either been (pre)selected by the PM and/or licensed by the ORSRE (see Figure 2). For warehouses involved in the WRS pilot or competition preselection for the groundnut value chain, we spoke with warehouse operators that were preselected by the PM, as well as those licensed by the ORSRE and preselected by the PM<sup>15,16</sup>. For the cashew value chain, we spoke with warehouse operators licensed by the ORSRE, warehouse operators that were licensed and selected by the PM, and warehouse operators that were neither selected nor licensed (see Section 1.3 for more information on selection criteria).<sup>17</sup>

<sup>15</sup> Most warehouse operators who work in the groundnut value chain also operate in maize, millet, cowpea, and other “cereal” crop storage activities even if we refer to those, in this baseline report, as “groundnut operators”.

<sup>16</sup> We also spoke with non-preselected and non-licensed warehouse operators as part of our scoping activities and shared these findings during the March 2022 Steering Committee meeting. Given the diversity and volume groundnut warehouse operators preselected by the PM, we did not see a need (as part of our official PT baseline) to speak with additional non-preselected/non-licensed groundnut warehouse operators.

<sup>17</sup> This group of non-licensed non-preselected warehouses is not a control group per se, but we have included it for cashew warehouse operators to better understand the functioning of cashew warehouses that had not interacted with the WRS in any way.

Figure 2: Warehouse operators' experience in the WRS/AgResults by value chain<sup>18</sup>



## 2.3 Data handling

We have taken measures to ensure that all data collected through the PT baseline respects respondents' privacy and consent. At the beginning of each KII, we solicited informed consent from the respondent before proceeding, as per best practices in survey ethics.<sup>19</sup> Raw data collected during PT has been password protected and encrypted to protect respondents' privacy, with access provided only to members of the IDinsight team. Furthermore, we committed to a data-sharing agreement with the ORSRE to facilitate their sharing of information regarding warehouse operators with us.

## 2.4 Data analysis

We have structured our data analysis by stakeholder group (as defined in Section 2.2). For each stakeholder group, we have listed qualitative indicators (e.g. "warehouse model benefit SHF directly") and manually tallied stakeholder responses to each indicator. Once tallied, we have applied frequency markers to categorize indicator frequencies more easily. In this report, we present our findings using only these frequency markers (and not percentages) to streamline and systematize our analysis. The table below breaks down these markers.

<sup>18</sup> One of the warehouse operators who was both selected by the PM and licensed by the ORSRE for the cashew value chain was also preselected by the PM for the groundnut value chain (we are including this operator in the former category, not the latter). Furthermore, three of the ORSRE licensed cashew warehouse operator had not officially received licensing at the time of the interview, but expected to receive it shortly, and were included in the list of licensed warehouses provided by the ORSRE.

<sup>19</sup> For each interview, we explained the context of the AgResults competition and our evaluation, introduced ourselves to respondents as completely independent from the PM and assuring that any data collected would have no bearing on their selection in the competition, and subsequently required verbal informed consent from the respondent to continue with the interview and to record the interview (respondents could consent to the interview without giving consent to the recording of the discussion).

Table 4: Frequency markers summary

Percentage value	Frequency Marker
F = 100%	All
80% <F < 100%	Almost all
50% <F <= 80%	A majority
30% <F <= 50%	Several
0% <F <= 30%	Some
F=0%	None

We calculate frequency markers based on the number of respondents who are able to respond to a given question. For example, certain warehouse operators expressed their interest in AgResults but had not begun storing, as they did not yet have a storage facility available to them (but had plans to begin operating one soon).<sup>20</sup> In these cases, we code their responses to certain indicators where they do have information available (e.g., previous experience accessing finance).

For quantitative data, we calculate an average value for numeric data (e.g., amount of last loan received by warehouse operator). In similar fashion, we calculate these averages based on the number of respondents who have information available, and exclude respondents with no information available from the denominator (e.g., warehouse operators who have never received a loan). For each average included in the report, we provide the exact number of respondents who do not have information and are therefore excluded from the denominator.

## 3. Findings: Evidence for Evaluation Questions

### 3.1 Introduction to findings

The findings in Section 3 follow the structure of the evaluation questions defined by AgResults<sup>21</sup>, focusing on those specifically targeted by our PT. As discussed in Section 2.1, we will focus our PT approach on causal and descriptive lenses (leaving prospective analysis for follow-up evaluations). We thus apply these two lenses to each specific evaluation question within EQ1, EQ3 and EQ4 (where relevant). For each specific EQ, we analyze initial evidence collected from April to June 2022 for and against the achievement of competition goals at baseline, and suggest potential evidence that could assess progress towards these goals at our follow-up evaluations. Based on this evidence, we outline key takeaways for each EQ – namely whether based on evidence from interviews with AgResults Senegal Crop Finance stakeholders, we expect the EQ’s goals to be achieved (or not) moving forward if project design and implementation strategies remain the same as observed during the conception of

<sup>20</sup> 2 out of 31 warehouse operators have information available on what storage practices they intend to implement but do not yet have access to storage facilities– this information is analyzed as part of our coding.

<sup>21</sup> When building our evaluation design, we came up with overarching evaluation questions (based on the AgResults evaluation framework) that we adapted to the Senegal Crop Finance project, and designed specific EQ (for each overarching EQ) to be able to assess the causal claims of the intervention more precisely. For more details, please see IDInsight’s Evaluation Design Document.

this report. As the project expands, operates in a more enabling WRS environment, and includes a wider range of participants in future years, we will be revising our analysis on expected outcomes in the follow-up iterations of our PT.

Table 5 below presents the EQ relevant to our PT baseline report.

*Table 5: Evaluation questions for Process Tracing baseline*

<u>Overarching EQ</u>	<u>Specific EQ for Senegal Crop Finance Project</u>
1. What is the impact of the AgResults Crop Finance project on <b>private sector involvement in the development of warehouse storage and the WRS?</b>	<p><b>1a.</b> Does the competition encourage the development and upgrading of warehouse storage facilities?</p> <p><b>1b.</b> Does the competition encourage the professionalization of storage in Senegal?</p> <p><b>1c.</b> Do the competitor warehouses offer any advantages vs. existing options for storage?</p> <p><b>1d.</b> To what extent does this competition encourage warehouse operators to better understand SHF needs and adapt storage facilities accordingly?</p> <p><b>1e.</b> To what extent does this competition encourage the banking sector to participate in the WRS?</p> <p><b>1f.</b> To what extent does this competition encourage warehouse operators to participate in the WRS?</p>
3. What is the impact of the AgResults Crop Finance project on <b>net SHF income for potentially stored crops?</b>	<p><b>3a.</b> Does the competition increase gross and net SHF income?</p> <p><b>3b.</b> Do SHF who store receive higher sales prices for their crops?</p> <p><b>3c.</b> Are there spillover effects onto SHF in the community who do not store crops?</p>
4. What evidence exists that the AgResults Crop Finance project is <b>scalable</b> and that its effects will be <b>sustainable</b> in the medium to long term?	<p><b>4a.</b> Does the competition encourage sustained upgrade and development of warehouse storage?</p> <p><b>4b.</b> Does the competition encourage the sustained use of the WRS?</p> <p><b>4c.</b> Does the competition encourage sustained access to and uptake of storage by SHF?</p> <p><b>4d.</b> Does the competition encourage sustained access to and uptake of financing by SHF?</p> <p><b>4e.</b> To what extent does the price seasonality mechanism between harvest and non-harvest season sales sustain in the medium to long term?</p>

For EQ3, we look into the corresponding specific EQ in the following manner:

- **EQ 3a** is considered at baseline given that our discussions with warehouse operators lead to initial findings on the storage models used by operators, and the implications of these models for SHF revenues. We will further investigate this EQ during our Impact Evaluation, which focuses on SHF-level indicators.
- **EQ 3b and 3c** are not considered in this PT baseline as they pertain directly to SHF storage practices, which we intend to analyze more substantively through our Impact Evaluation.

For EQ4, we address the relevant specific EQ in the following manner:

- **EQ 4a and 4b** are not considered at baseline given that EQ 1a and 1f (respectively) already address these issues. EQ 4a and 4b examine the same topics as EQ 1a and 1f (namely storage upgrading and WRS take-up) but with a focus on the sustainability of these changes. As the competition advances, we will be better equipped to investigate evidence of sustainable project effects.
- **EQ 4c and 4d** are similarly not considered in this PT baseline as they pertain directly to SHF behavior, which we intend to analyze more substantively through our Impact Evaluation (as discussed in the evaluation design).
- **EQ 4e** remains part of our baseline evaluation in order to capture data on price fluctuations prior to and during the competitors' participation in AgResults. Based on evidence collected, we will be able to better understand in follow-up evaluations if price seasonality will sustain after the competition's completion.

## 3.2 Upgrading of storage facilities

### Evaluation question

- **Does the competition encourage the development and upgrading of warehouse storage facilities? [1a]**

EQ 1a focuses on the competition's effect on investment in and implementation of storage facility upgrades and warehouse construction. The competition's Phase 1 prize is designed to incentivize investment in this area by warehouse operators. Our baseline PT looks into the structuring of the Phase 1 prize by the PM, and whether any storage facilities upgrade has been made through the WRS pilots

### Initial evidence for goal's achievement

At baseline, **100% of the Phase 1 prize was reserved for warehouse operators, who could use this funding to invest in warehouse upgrades as intended.** Rather than allocating a percentage of the Phase 1 prize money to the CM (see Section 1.3.1), who would not use it to pay for permanent warehouse upgrading given that warehouses in the competition are not owned by CM, this decision could encourage warehouse operators to invest in higher quality storage facilities through meaningful infrastructure upgrades.

**Furthermore, government regulators affirmed the belief that if Phase 1 prize money went to warehouse operators (and not to CM), it could incentivize warehouse improvements.** Given regulator representatives' direct contact with warehouse operators through the WRS pilots, we consider their perspective on the potential utility of the Phase 1 prize for operators pertinent. So long as the prize allocation is not readjusted, warehouse operators may be incentivized by the competition prize to upgrade their facilities in order to participate in Phase 1, as long as they know that they will be compensated for their investments.

### Initial evidence against goal's achievement

**Warehouses involved in WRS pilots, and those preselected for the AgResults competition, did not need to invest in significant storage upgrades to participate.** This may evolve as the project expands

and includes a wider range of participants in future years, but so far, the ORSRE (and consequently the competition) have prioritized the selection of warehouses with storage quality norms that already meet WRS standards (e.g., humidity level, protection against risk of electrical fire). Meanwhile, the lack of clarity at that stage around the AgResults (pre)selection process that takes place in addition to the ORSRE licensing, makes it riskier for warehouse operators who need to conduct significant upgrades to make this investment<sup>22</sup>. Furthermore, CM have been primarily responsible for bringing necessary materials and equipment for storage management. While some cashew warehouse operators preselected for the competition intend to invest in equipment, these investments appear marginal and will take place after the disbursement of the Phase 1 prize. Given that warehouse operator awareness of competition incentives (including the Phase 1 prize) was limited, any significant upgrades or equipment purchases that may have taken place at preselected warehouses did not occur due to the competition itself.

**Furthermore, the storage usage rate last year among surveyed warehouse operators proved to be low.** We calculate usage rate as the total tonnage of crops stored last year (2021) divided by the total storage capacity of the warehouse (in tons). The usage rate of warehouse capacity last year (among operators with information available<sup>23</sup>) was 62% on average<sup>24</sup>. This rate implies that storage was heavily underutilized, as a warehouse operating at full capacity during harvest season would have filled up (and emptied) its capacity at numerous points in one year (while our data did not even show an average of full capacity throughout an entire year). This finding indicates that warehouse operators had little incentive to invest in the construction of new storage facilities, and instead were more focused on increasing the utilization of existing facilities. Indeed, there was no construction of new facilities among surveyed operators as a result of the competition or the WRS. While not an explicit goal of the AgResults competition’s Theory of Change, the construction of new warehouses could signal the development of improved storage facilities.

### Potential evidence for future consideration

The presence of the following potential evidence could add weight to the goal that the competition will encourage warehouse development and upgrading:

- Competitor warehouses invest in storage upgrades after familiarizing themselves with the competition and its prizes.
- Competitor warehouses claim that they invested in storage upgrades in order to qualify for the Phase 1 prize.

### Takeaways

**Goal:** The competition will encourage the development and upgrading of warehouse storage facilities.

**Expected outcome:** Goal is *not likely* to be achieved.

**Rationale:** Provisionally licensed warehouse operators did not need to invest in upgrades or new equipment to get licensed and/or participate in the competition as the competition and the

<sup>22</sup> The additional barrier to entry imposed by the AgResults preselection process increases the risk of not receiving the Phase 1 prize even if the warehouse has managed to upgrade and reach WRS standards and ORSRE licensing.

<sup>23</sup> 23 out of 31 warehouse operators had information available for this claim.

<sup>24</sup> We heard from PO that this year was a weak harvest compared to previous years for groundnut. However, the low storage rate held across value chains. Nevertheless, we will track how storage uptake advances throughout the 5 years of the competition, to be able to provide more insights into the effect of external weather/other shocks on storage uptake.

government regulatory body chose to collaborate with warehouses that already meet certification standards<sup>25</sup>. Additionally, given the competitive AgResults (pre)selection process that takes place in addition to the ORSRE licensing, it is risky for warehouses operators to invest in significant upgrades with the hope of receiving the Phase 1 prize. So long as this selection strategy and the AgResults (pre)selection process remain in place, AgResults will likely not induce significant storage facility upgrades.

### 3.3 Professionalization of storage in Senegal

#### Evaluation question

- **Does the competition encourage the professionalization of storage in Senegal? [1b]**

EQ 1b seeks to understand the extent to which the competition is able to professionalize the storage sector in Senegal. Professionalization of storage can take place through three distinct pathways: (1) existing CM manage more warehouses and implement their professional storage practices, (2) new CM enter the sector in Senegal and begin operating warehouses so that there are more professional actors in the sector, and (3) existing non-CM storage actors (e.g. producer organizations) professionalize their storage practices (e.g., thanks to the increased involvement of CM or incentives from WRS licensing to enhance their practices and train themselves). Examples of improved storage practices include the purchase and use of appropriate equipment (e.g., pallet, sealed bags), protection against leaks and high humidity levels, and sensitization of warehouse employees around proper crop storage processes and techniques (including weighing and monitoring stored crops). The evidence below examines the competition’s ability at this stage to encourage the professionalization of storage in Senegal according to these three dimensions.

#### Initial evidence for goal’s achievement

Warehouse operators typically owned storage facilities that they used and managed for crop storage. However, a majority of warehouse operators surveyed at baseline had not previously worked with a CM. As a result, these warehouses were not currently benefitting from the storage management expertise brought by a CM, who is specialized in storage management techniques.

Given this, **professionalization of storage will likely improve once existing CM begin managing more warehouses (pathway 1)**. A majority of financial institutions and several warehouse operators supported this view, claiming that the WRS could encourage better quality storage and management of stocked crops, due in large part to the role of CM in the system. Improvements may include better data collection around crop storage and sales, and more frequent use of sealed bags to protect against pests or environmental hazards, leading to less post-harvest loss.

#### Initial evidence against goal’s achievement

Yet, while increased collaboration with CM may improve storage quality, **some warehouse operators cited high CM fees as a potential obstacle to their participation in the WRS**. In one case, a warehouse operator explored the possibility of contracting with a CM until (according to the operator) they

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<sup>25</sup> We understand that this selection strategy that prioritizes more capable warehouses at this stage will likely evolve as the project continues.

learned that it would cost 100,000 CFA (~160 USD) per month in fees, an amount the operator was not able to pay. So long as CM fees remain prohibitive to warehouse operators, the competition may disincentivize certain operators from joining the competition, thereby limiting the extent to which any professionalization of storage takes place.

Furthermore, **new CM are unlikely to enter the WRS market** (pathway 2). So far, WRS stakeholders (e.g., PM, ORSRE, FI) have prioritized working with Ace Global over other CM (Procontrole and EGF) and a majority of warehouse operators across groundnut and cashew pilots signed contracts with Ace Global as a result<sup>26</sup>. Ace Global has been the most active partner for the AgResults competition (and ORSRE) so far, even though Procontrole and EGF have signed partnerships with the ORSRE and may end up expanding their service coverage across Senegal in the coming years. However, given the clear prioritization of Ace Global at this stage, the entry of any additional CM in the WRS mechanism in Senegal would be very difficult.

Finally, the **competition is unlikely to create the conditions for warehouse competitors to build organic storage management capacities and professionalize independently**. Given that collateral management is a prerequisite for ORSRE licensing currently, Ace Global (and potentially Procontrole and EGF) will become more involved in the storage sector, yet this may not lead to the professionalization of other storage actors (pathway 3) *per se*. Representatives of the ORSRE stressed the need for the training of PO and SHF on best storage practices in the coming years for the competition to contribute to the transfer of storage management expertise.

### Potential evidence for further consideration

The existence of the following potential evidence could demonstrate proof that the competition is encouraging the professionalization of storage in Senegal:

- Warehouse operators change storage practices after partnering with CM through the competition.
- Warehouse operators claim that the competition has enabled them to change/improve storage practices.
- Warehouse operators who do not have internal storage management capacities consider CM fees to be reasonable and do not consider them an obstacle to participation in the WRS.
- Two or more CM in Senegal are actively involved in the competition and managing competitor warehouses.
- Decrease in post-harvest losses among competitor warehouses vs. non-competitor warehouses.
- Increase in use of sealed bags and spending on chemicals for crop storage among competitor warehouses vs. non-competitor warehouses.

### Takeaways

**Goal:** The competition will encourage the professionalization of storage in Senegal.

**Expected outcome:** It is **unclear** if the goal will be achieved.

**Rationale:** The competition currently requires warehouse operators to work with a Collateral Manager (CM)<sup>27</sup>, leading to more widespread use of professionalized storage practices. Yet, the

<sup>26</sup> We discuss this point, and other implementation-related observations in more detail in Section 4.

<sup>27</sup> This is a requirement of participation in the WRS by the Organe de Régulation du Système de Récépissé d'Entrepôt de marchandises au Sénégal (government regulatory body for the WRS).

competition does not seem likely to transfer storage management expertise to non-CM storage actors (e.g., producer organization). Also, it has set up a partnership with only one CM and does not seem likely to induce new CM to enter the market. Given this, it appears likely that the competition will help professionalize the storage sector in Senegal through the increased involvement of the one partner CM, but may not encourage professionalization through other means.

### 3.4 Understanding SHF needs and providing better services/advantages to SHF

#### Evaluation questions

- **Do the competitor warehouses offer any advantages vs. existing options for storage? [1c]**
- **To what extent does this competition encourage warehouse operators to better understand SHF needs and adapt storage facilities accordingly? [1d]**

We combine evidence for EQ 1c and 1d into one section in order to illustrate the potential advantages related to improved services that the competition could bring about for SHF. However, any evidence related to the benefits of the WRS for SHF will be covered in EQ 1f. Instead, this section will look at the extent to which the competition is able to encourage the development of services such as improved transport to warehouse facilities and the purchase of new storage equipment.

#### Initial evidence for goal's achievement

As illustrated in Section 3.2, warehouses surveyed at baseline typically stored at less than capacity. A reason for this low utilization rate is the fact that SHF are generally unable or reluctant to take up storage. While discussing this problem, warehouse operators were able to identify a range of services that could attract more SHF to store (or sell their crops to producer organizations for storage), such as transport of crops to the warehouse (cited by some operators), sensitization of SHF about the benefits of storage (cited by some operators), and aggregation through purchase of SHF crops (cited by some operators). Yet, some warehouse operators stated that a lack of financial means prevented them from offering these services.

**Given this financial need, several warehouse operators cited that they would use the Phase 2 prize (and additional financing through the WRS more generally) to offer better services to SHF.** In this way, the competition could provide warehouse operators the financing needed to better attract and retain SHF storage take-up. Potential uses of additional financing included:

- **Purchasing new storage equipment** to improve the quality of storage and better protect crops (cited by some warehouse operators),
- **Investing in new means of transportation** such as trucks or horse-drawn carriages to ensure that SHF, particularly those situated far from warehouses, could more easily deposit and store their crops (cited by some warehouse operators),
- **Providing small-scale credit to SHF** at affordable interest rates to help SHF meet their financing needs (cited by some warehouse operators).

#### Initial evidence against goal's achievement

**Warehouses that already participate in the WRS have generally not offered transport and other complementary services to SHF.** For a majority of warehouse operators that had already participated in the WRS, SHF who utilized storage transported crops to the warehouse without support from the operator. Yet, according to several warehouse operators, transporting crops to a warehouse posed problems for SHF given that warehouses were typically not located in direct proximity to zones of production. Given this finding, it is not clear how the competition would encourage warehouse operators to offer transport and other services that meet SHF needs.

### Potential evidence for future consideration

The following potential evidence could help illustrate that the competition generates new advantages and services for SHF:

- Warehouse operators in the competition improve/invest in new services catered to SHF in comparison to non-competitor warehouses.
- Warehouse operators cite the competition as the enabler for them to offer improved/new services to SHF.

### Takeaways

**Goal:** The competition will encourage the private sector to better understand SHF needs and offer better services to SHF accordingly.

**Expected outcome:** It is **unclear** if the goal will be achieved.

**Rationale:** Warehouse operators seemed aware of smallholder constraints, notably in terms of accessing warehouses, but mentioned that they have so far been unable to meet these needs due to a lack of funding. If the competition induces warehouse operators to use the WRS, and operator revenues increase as a result (for storage models that accumulate revenues at the operator-level), operators may be able (and decide) to invest this new revenue in improved storage-related services for smallholders.

## 3.5 Banking sector participation in the WRS

### Evaluation question

- **To what extent does this competition encourage the banking sector to participate in the WRS? [1e]**

EQ 1e seeks to understand how the competition incentivizes FI to participate in the WRS. At baseline, a majority of FI surveyed had participated or were participating in WRS groundnut and cashew pilots. To better understand FI incentives to join the WRS, our PT approach investigated current financing practices among surveyed FI, and looked into how they expected those practices to change (or not) through the WRS. With regard to current practices, a majority of FI have financed private non-PO storage actors (i.e., storage businesses), while some have financed cooperative PO. In terms of who typically stores in the warehouses financed by FI, several FI stated that traders were the primary depositors in warehouses they financed, while some said that PO and SHF were the main depositors. With this in mind, the following section provides evidence on the competition's (potential) effects on FI participation in the WRS, and the efficacy of FI participation (e.g., timeliness of credit disbursed through WRS).

## Initial evidence for goal's achievement

Overall, **financial institutions viewed the competition positively, and their funding allocated towards WRS appeared significant** (in comparison to existing agricultural loans). A majority of FI were interested in participating in AgResults. In particular, several FI believed that AgResults could incentivize them to provide more financing to SHF.<sup>28</sup> For FI who were able to provide figures<sup>29</sup>, they estimated that they would provide 1,387.5 million FCFA on average for WRS loans next harvest season, in comparison to the 1,250 million FCFA on average committed to non-WRS agricultural loans (e.g., agricultural inputs) the next harvest season. This indicates that the WRS at this early stage could potentially mobilize funding equal to or greater than existing non-WRS agricultural loans among the FI surveyed.<sup>30</sup>

## Initial evidence against goal's achievement

**However, the operationalization of the WRS for FI has been challenging up to this point.** Aligned with other stakeholders, several financial institutions believed that sensitization of SHF was needed to ensure the success of the WRS. Without this sensitization, these FI feared that storage take-up among SHF would be limited. In addition to these concerns, FI have themselves faced operational challenges. In fact, some warehouse operators had their receipts rejected by FI through the WRS due to poor communication between FI headquarters and local branches. These warehouse operators explained that when they tried to deposit the third-party verified receipt at the partner bank, the receipt was refused, and they were not able to receive a loan. The bank's rejection of the receipt was apparently due to a miscommunication between bank headquarters (which engaged more closely with WRS stakeholders), and their local branches responsible for transacting with WRS users themselves. If not addressed, these challenges may obstruct FI participation in the competition and in the WRS, limiting the total amount of credit disbursed through the system.

## Potential evidence for future consideration

The following potential evidence could demonstrate that the competition encourages the banking sector to participate in the WRS:

- Financial institutions cite AgResults as the reason for their participation in the WRS.
- Financial institutions cite AgResults as the reason for their increased financing through the WRS.
- Total loan amount provided by FI to warehouse receipt holders through the AgResults competition increases every year.
- Delays for FI to disburse credit after having received the warehouse receipt decrease in comparison to delays for approval and disbursement credit for non-competitor warehouses.

## Takeaways

**Goal:** The competition will encourage the banking sector to participate in the WRS.

**Expected outcome:** Goal is *likely* to be achieved.

<sup>28</sup> One FI claimed that the additional support provided by the competition to help manage the WRS could mitigate some of the bank's risk in implementing the new system in Senegal.

<sup>29</sup> 4 out of 5 FI had available information for this question.

<sup>30</sup> Furthermore, evidence from one FI (Orabank) indicates that the loan amounts offered for the previous harvest season through non-WRS loans (2500 million FCFA) would remain stable for the upcoming harvest season. Thus, we do not have evidence to suggest that the expected increase in credit through the WRS will reduce other non-WRS credit offered.

**Rationale:** Financial institutions (FI) expressed clear interest in the competition and plan to allocate relatively high credit amounts through the WRS. However, it is less certain that FI will be able to participate in an effective and timely manner, given existing problems with accepting and processing warehouse receipts.

## 3.6 Warehouse operators' participation in the WRS

### Evaluation question

- **To what extent does this competition encourage warehouse operators to participate in the WRS? [1f]**

This section focuses on evidence connected to the use of the WRS by warehouse operators and value chain actors, as well as the benefits and challenges facing SHF vis-à-vis the system, as this may induce/impede warehouse operators from participating in the WRS. As opposed to Section 3.4, it does not concentrate on the advantages/services offered to SHF through operators' participation in the WRS (e.g., improved transport).

While a majority of warehouse operators surveyed had heard of AgResults, their understanding of the competition appeared limited. Due in part to the fact that several warehouse operators had already participated in the WRS, stakeholders were able to share more perspective on the benefits and drawbacks of the WRS, but not the AgResults competition itself. For this reason, at baseline, we were only able to look more generally at the extent to which warehouse operators (and SHF) have been incentivized to participate in the WRS, and not specifically at the effects of the AgResults competition. We hope to be able to evaluate the impact of the competition itself (independent of the impact of WRS pilots) in our follow-up evaluations when we expect awareness of the competition to be more widespread among warehouse operators.

### Initial evidence for goal's achievement

**Financial conditions offered through the WRS were perceived as more favorable for warehouse operators than existing financing options.** In terms of existing options, warehouse operators and their affiliated SHF that accessed finance did so at two levels: operator level (for a majority of operators) and SHF level (for some operators). For warehouse operators that received financing, a majority used it to aggregate crops from SHF, some used it to buy agricultural inputs, and some used it to purchase storage equipment. However, several warehouse operators stated that neither they nor their affiliated SHF had ever received financing of any kind. Nevertheless, despite respondents' diverse experience with the banking sector, our PT revealed that WRS financing conditions seemed more attractive to warehouse operators and value chain actors for the following reasons:

- **Guaranteed collateral** – some warehouse operators and several value chain actors stated that the collateral generally required for loans is hard to obtain and/or leads to poor financing conditions (e.g., high interest rates). As opposed to other loans that demand difficult-to-obtain collateral, the WRS guarantees collateral through third-party verification and receipting of stored crops.
- **Slightly lower interest rates** – several warehouse operators cited high interest rates as a problem with existing credit options. Financial institutions cited interest rates between 7-

12.6% for SHF through the WRS, compared to 8.5-14%<sup>31</sup> offered to SHF through non-WRS loans.

- **Timeliness of credit** – some warehouse operators claimed that previous financing had arrived too late in the year, according to their needs. A majority of warehouse operators cited a need for financing during the harvest season, however existing financing options typically did not reach warehouse operators until several months later. Contrary to existing financing, WRS is expected to deliver financing to warehouse operators and any other depositors including SHF, during the harvest season when need is greatest, typically within a week once a receipt is presented.

Generally speaking, **stakeholders also believed that the WRS could lead to higher revenues for SHF and other depositors**. Confidence in this claim was high among different actors – almost all warehouse operators believed that the WRS could lead to higher revenues for SHF, and all value chain actors believed that the WRS could increase their own revenue. Stakeholders identified three main ways that the WRS could lead to higher revenues for SHF / other users of the system:

- **Access to finance** was cited as a driver of revenue growth by a majority of warehouse operators, a majority of value chain actors, and some FI.
- **Higher profitability of crop sales due to price seasonality** was considered an important part of increasing depositors' revenue by a majority of warehouse operators, a majority of value chain actors, and some FI.
- **Better quality storage of crops** (e.g., through upgrading of warehouses for certification, professional management by CM) was cited as key to raising revenues by several warehouse operators, some value chain actors, and some FI. For example, several FI mentioned insurance for stored crops through the WRS as a crucial element to protecting the value stored goods.

Given these reasons, a majority of warehouse operators and several FI believed that the WRS would encourage more storage take-up among SHF – similarly, a majority of value chain actors stated that they themselves would increase their storage take-up thanks to the WRS.

Furthermore, **despite limited understanding of AgResults, certain stakeholders expressed general interest in the competition**. Overall, warehouse operators struggled to differentiate between the WRS and AgResults due to a lack of information regarding the competition – not coincidentally, several warehouse operators stated that more sensitization was needed regarding the AgResults competition. Nevertheless, other actors more familiar with the competition expressed interest in AgResults, suggesting that the competition could incite them to participate in the WRS. Several FI believed that the competition could encourage them to finance more SHF through the WRS (e.g., thanks to additional supervision/training by AgResults PM), while several value chain actors were also interested in participating in the AgResults competition.<sup>32</sup>

### Initial evidence against goal's achievement

Despite these advantages cited by diverse actors, one key barrier to competition participation arose during stakeholder discussions: **warehouse operators were forced to interface and pay fees to other actors involved in the WRS in a way that could disincentivize their participation in the system**. As

<sup>31</sup> 5 out of 5 FI had information available for this claim.

<sup>32</sup> One value chain actor mentioned that participation in AgResults would grant them more visibility vis-à-vis FI, and would further encourage FI to offer them credit through the WRS.

mentioned in Section 3.3, some warehouse operators cited high CM fees as an obstacle to their participation in the WRS (and consequently in the competition). Furthermore, warehouse operators have been forced to confront certain challenges related to the banking sector. Some warehouse operators explained that charges related to opening and maintaining a new bank account at a partner FI (e.g., monthly account fee) discouraged their participation in the WRS.

**Implementation challenges with the WRS pilots may discourage warehouse operators from continuing with the WRS and other operators from participating.** For the ORSRE groundnut pilot, storage take-up in the licensed warehouses was very low due to a multitude of factors, including the lateness of the pilot, high CM fees, and confusion with AgResults.<sup>33</sup> Implementation problems also arose for the ORSRE cashew pilot. Some warehouse operators expressed that the cashew pilot began too late in the season, when cashew prices were already high and SHF had already sold a lot of their production – thereby reducing the likelihood of storing being beneficial for SHF/other depositors. As described in Section 3.5, problems arose between warehouse operators and FI who rejected their WRS receipts due to a miscommunication at the FI-level. Overall, these implementation challenges may have lasting effects on warehouse operators’ willingness to participate in the WRS.

**WRS participation may also prove difficult for warehouse operators that do not have available financing prior to the first WRS loan.** For a majority of warehouse operators who use storage model 1 (i.e., buy crops from SHF, then sell and keep revenues at operator level) or storage model 3 (i.e., buy from SHF, sell crops, and distribute some revenue to SHF), they depend on sufficient initial financing to be able to purchase SHF crops up front. Yet, according to some warehouse operators, the fact that the WRS provided financing after crop storage meant that the operator did not have the initial financing needed to aggregate SHF production for storage. Without sufficient financing prior to the first WRS loan, these warehouse operators would not have any crops to store through the WRS.

Furthermore, **several warehouse operators claimed that awareness-raising efforts around the WRS were needed to encourage SHF participation.** According to these operators, without this sensitization, SHF may either be unaware of the WRS, or hesitant to trust the newly implemented system. SHF’s lack of awareness around the WRS may discourage warehouse operators from participating in the system, as they would likely need to conduct this sensitization themselves in order to convince SHF to participate (for warehouses that use direct SHF storage models).

With regards to AgResults itself, **warehouse operators’ lack of awareness regarding the competition may be a barrier to participation.** Some warehouse operators cited the need for more communication regarding competition details (e.g., expected CM fees incurred) and AgResults (pre)selection process. In these cases, warehouse operators were not familiar with what their participation in the competition would entail, how exactly they would stand to benefit (independent of their participation in the WRS), and when they would hear back about their status in the competition. These factors combined might have further impeded warehouse operators from applying for and/or participating in AgResults and are likely to disincentivize participation if not addressed.

## Potential evidence for future consideration

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<sup>33</sup> According to government and expert stakeholders, reasons for low take-up were numerous. To begin, the pilot began too late in the campaign, when groundnut crops had already largely been sold (especially as production this year was lower than usual due to bad weather conditions) and there was little room for prices to further increase. Next, warehouse operators were unwilling and/or hesitant to pay CM fees for storage, given their prohibitive cost (as explained in Section 3.3). Finally, government regulators claimed that AgResults may have created confusion and ultimately discouraged warehouse operators, who thought that by participating in the pilot they would receive the Phase 1 prize, when in fact they later learned that they would not be receiving any prize amount.

The following potential evidence could provide insights into whether the competition encourages warehouse operators to participate in the WRS:

- The AgResults competition builds awareness of the WRS among warehouse operators and operators state that they were induced to participate in the WRS thanks to AgResults (whether or not they end up being competitors themselves).
- The number of competitors using the WRS increases over the course of the competition.
- Warehouse operators cite the AgResults competition as the reason for their participation in the WRS.

### Takeaways

**Goal:** The competition will encourage warehouse operators to participate in the WRS.

**Expected outcome:** It is *unclear* if the goal will be achieved.

**Rationale:** The competition's ability to induce participation in the WRS is largely contingent on warehouse operators and smallholders' trust in the system. If the competition is able to increase revenues for operators and address some of the WRS challenges (e.g. high CM fees, smallholders' lack of awareness, implementation failures), the competition will likely be successful in encouraging participation in the WRS. However, if these challenges persist, WRS take-up may stagnate. Until operators have experimented further with the system and the competition, it is difficult to know if the competition will be able to achieve this goal.

## 3.7 Storage models and implications for SHF revenues

### Evaluation question

- **Does the competition increase gross and net SHF income? [EQ 3a]**

To understand the impact of the competition on gross and net SHF income, we investigate the different storage models utilized by warehouse operators, and the implications of these storage models for SHF revenue generation. First, we will consider the different characteristics of warehouse operators surveyed as part of our PT baseline, namely the types of crops stored, warehouse type (i.e., PO vs. non-PO), storage model used, etc. These data provide insight into the diversity of warehouse characteristics present in surveyed warehouses and illustrate differences in warehouses across value chains. Based on this information, we share initial evidence supporting and refuting this project goal, namely that the competition increases net SHF income.

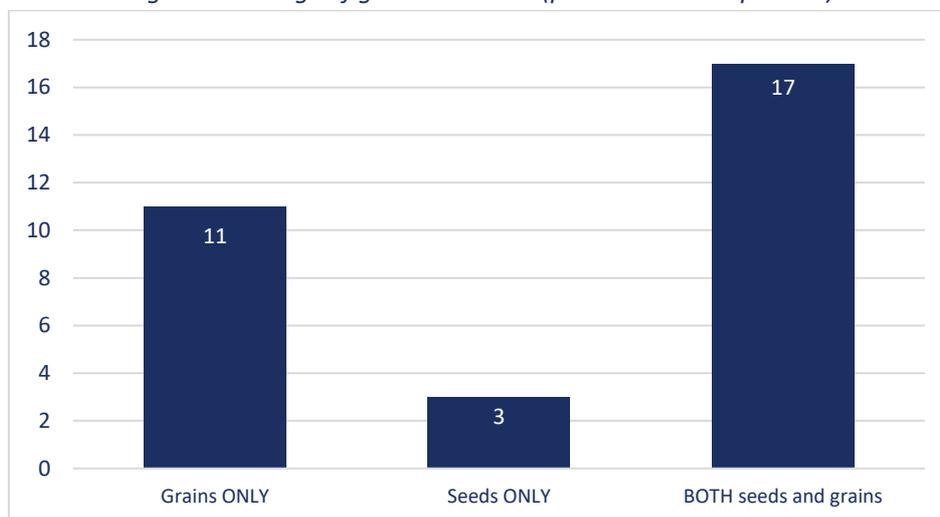
### Storage models and practices

Warehouse operators interviewed have cited a range of different storage practices across value chains. In terms of storage, a majority of warehouse operators stored both seeds and grains<sup>34</sup>, while several stored grains only and some stored seeds only (see Figure 3). For a majority of warehouse operators, crops in their warehouse(s) were for sale only. For some warehouse operators, crops were

<sup>34</sup> Of warehouse operators that stored both seeds and grains, a majority stored more grains than seeds.

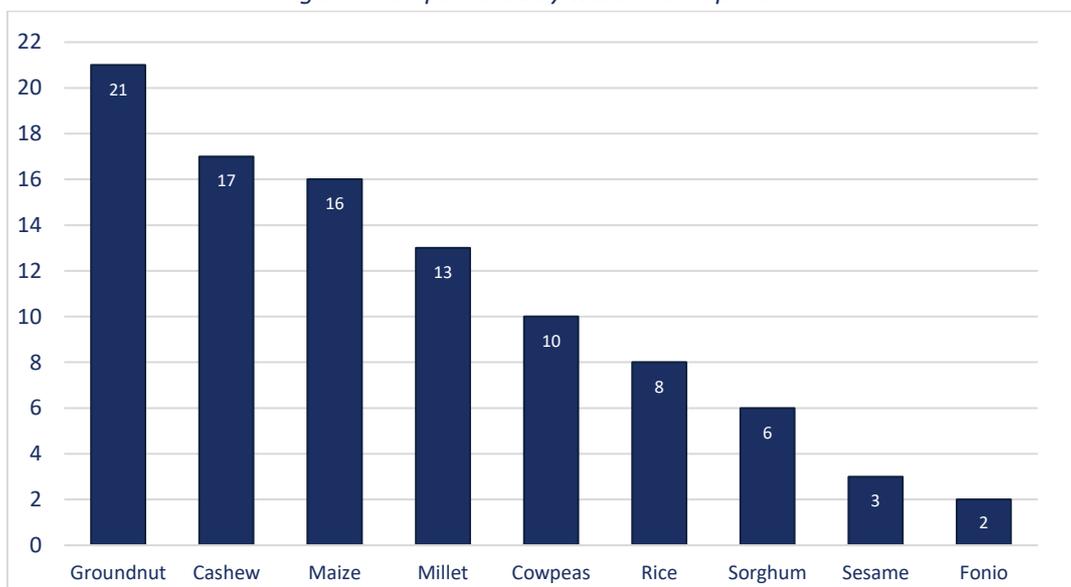
stored for both sale and self-consumption of SHF – no warehouse operators stored crops for self-consumption only.

Figure 3: Storage of grains vs. seeds (per warehouse operator)



Warehouse operators in our sample also varied in terms of types of crops stored. A majority of operators stored more than one type of crop in their warehouse, while some – predominantly cashew operators – stored only one crop type.<sup>35</sup> As shown in Figure 4, a majority of warehouse operators stored groundnut, cashew, and maize, with several operators storing millet and cowpeas, while some stored rice, sorghum, sesame, and fonio.

Figure 4: Crops stored by warehouse operators



In terms of storage practices, we identified five storage models according to whether they could directly benefit (or not) SHF (see Figure 5). We define a model as “directly” benefitting smallholders if smallholders directly receive money from the sale of stored crops. It is possible for the models that

<sup>35</sup> 7 out of 8 warehouse operators that stored only one crop stored cashew.

don't directly benefit smallholders to provide other kinds of indirect benefits. Below we define the different models used by operators.

#### Models that do not directly benefit SHF revenues:

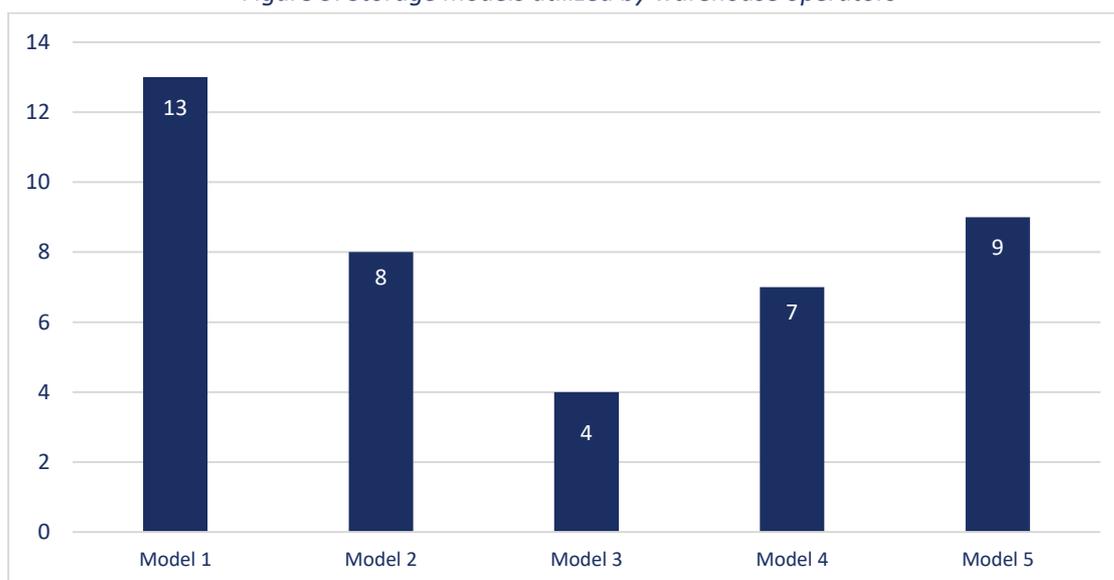
1. Warehouse operator buys crops from SHF at market price, stores crops, resells them later, and keeps all sales revenue.
2. Warehouse operator receives in-kind reimbursements from SHF (e.g., for input purchases), stores and sells them later, and keeps all sales revenue.

#### Models that could directly benefit SHF revenues:

3. Warehouse operator buys crops from SHF at market price, stores crops, resells them later, and distributes (a percentage of) sales revenue to SHF.
4. SHF store crops directly, warehouse operator sells the crops in bulk on behalf of SHF, and operator distributes (a percentage of) sales revenue to SHF.
5. SHF store crops, sell them later, and keep all sales revenue themselves.

While a majority of warehouse operators function on only one model, several operators used a combination of storage models. In particular, several warehouse operators used only models that did not benefit SHF (models 1 and 2).

Figure 5: Storage models utilized by warehouse operators



#### Initial evidence for goal's achievement

**A majority of warehouse operators in our sample did use (some) storage models that could benefit SHF directly.** These operators used models 3, 4 and 5, which allowed SHF the opportunity to benefit from crop storage and sale (at higher prices in principal). Model 5 was the most commonly available model of the three, and did not depend on warehouse operators to act as intermediary or primary actors in the storage or sale of SHF crops.

#### Initial evidence against goal's achievement

However, of the three models which could benefit SHF (3, 4, and 5), **models 4 and 5 rely on the fact that SHF will wait before receiving sales revenues and/or do not have short-term financial**

**constraints.**<sup>36</sup> While this is one of the central challenges that the WRS aims to address, respondents (including government actors) pointed out that, at this stage of the WRS in Senegal, PO were most likely to aggregate crop purchase and participate in the WRS themselves, not SHF directly. The primary reasons for low (direct) SHF participation include perception of SHF general hesitancy regarding the new system, delays in providing financing from participating FI, and SHF preference to be paid for crop sales immediately due to pressing financial constraints.<sup>37</sup> Furthermore, for the cashew value chain, any depositor (including SHF) must deposit a minimum of 500 kg to participate in the WRS directly, an amount that may be prohibitive to certain SHF. Given this, it appears likely that take-up from SHF based on models 4 and 5 will remain limited through the WRS, as these models force SHF to wait for financing from the WRS-affiliated FI.

**Furthermore, model 3 can only benefit SHF if the WRS functions effectively.** In this way, SHF can earn additional revenues through model 3 only if the warehouse operator using this model can increase the amount of crops purchased, stored, and sold as a result of additional financing (arriving in timely fashion) from the WRS.

Finally, **models 1 and 2 can only benefit SHF indirectly**, such as through equipment or input purchases by their PO, but may not directly lead to revenue increases.

### Potential evidence for future consideration

The following potential evidence could indicate whether the competition leads to increased revenues for SHF:

- The number of competitors using storage models that can directly benefit SHF revenues increases over the course of the competition.
- Warehouse operators cite the AgResults competition as the reason for their use of storage models that can directly benefit SHF.

### Takeaways

**Goal:** The competition will directly increase SHF revenues.

**Expected outcome:** It is **unclear** if the goal will be achieved.

**Rationale:** Warehouse operators used a range of storage models, including models that were unlikely to benefit smallholder farmers directly (though they may have indirect benefits in the long term), and models that could benefit smallholders directly. While a well-functioning WRS has the potential to unlock storage opportunities for credit-constrained smallholders, there are many barriers to smallholders storing, and it is unclear if the competition will be able to relax all of them. As a result, the competition looks most likely to benefit the warehouse operators, and any benefits to smallholders will be indirect.<sup>38</sup>

<sup>36</sup> This implies that these models are mostly benefiting wealthier SHF.

<sup>37</sup> According to interviews, banks can take up to a week to provide financing to depositors once they have received a receipt.

<sup>38</sup> Regarding harvest losses, only certain models can enable SHF to reduce storage losses - i.e. models where SHF store directly (4+5). In these cases, SHF may be able to benefit directly from better storage options. However, for other models where SHF sell to warehouse operators just after harvest rather than store directly (1+3), it's not clear that SHF would be able to reduce harvest losses this way. Warehouse operators would need to be able to offer new/better quality storage options, and be able to purchase more SHF production for the competition to be able to claim an impact for SHF through reduced harvest losses.

## 3.8 Price seasonality

### Evaluation question

- **To what extent does the price seasonality mechanism between harvest and non-harvest season sales sustain in the medium to long term? [4e]**

This EQ 4e focuses on the variance of price seasonality across value chains in Senegal, and the ability of depositors to benefit from this mechanism over time. While we cannot, at this stage, provide evidence on whether the price seasonality mechanism will sustain in the medium to long term, we can provide evidence on stakeholders' perspective towards price seasonality at baseline. For this reason, the following section investigates the viability of price seasonality mechanism – in other words, that crop prices generally vary between harvest and non-harvest seasons.

### Initial evidence for goal's achievement

**Across the board, stakeholders expressed high levels of confidence in the price seasonality mechanism.** All warehouse operators, all FI, and all value chain actors stated that crop prices generally increase after the harvest season for crops currently considered by the competition (e.g., cashew, groundnut, maize). Analysis of crop prices based on data from the National Agency for Statistics and Demography between 2018 and 2021 support the general claim that crop prices tend to increase between harvest and non-harvest seasons (see Annex). According to these data<sup>39</sup>, at the national level, the variance for crop prices (estimated as the % increase between the minimum price during harvest season and the maximum price during non-harvest season) was the following.

*Table 6: Variance in % price increase for local crop prices in Senegal (national average)*

Year	Cowpeas	Millet	Maize	Groundnut (unshelled)	Groundnut (shelled)	Cashew <sup>40</sup>
2018	24%	5%	14%	22%	19%	340%
2019	38%	2%	5%	56%	23%	150%
2020	32%	10%	16%	166%	38%	275%
2021	-4%	-1%	1%	37%	36%	155%

### Initial evidence against goal's achievement

**However, price increases may vary significantly from one year to another.** In this vein, several warehouse operators, several FI, and a majority of value chain actors cited that price increases may vary from year to year based on factors such as crop supply, local demand, and quality of the harvest. In particular for value chains that have large international demand (e.g., cashews and unshelled groundnut), price seasonality may vary significantly from one year to another, as shown in the table above. However, price increases are typically more significant for these value chains (e.g., 56% for groundnut in 2019 and 340% for cashew in 2018) compared to price increases in value chains that are

<sup>39</sup> National Agency for Statistics and Demography (NASD) : Senegal Data Portal, "Prix des produits agricoles", 09 March 2020 – <https://senegal.opendataforafrica.org/syysz/prix-des-produits-agricoles>

<sup>40</sup> Data for cashew prices was not available at the NASD, but was sourced instead from N'kalô, an independent commercial advisory service for the agri-food sector in Africa. Furthermore, prices were only available during the harvest months, but large price fluctuations still took place between February and July, which are recorded in the table above.

locally consumed (e.g., 2% price increase for millet in 2019). In some exceptional cases, these locally consumed crops may experience decreases after the harvest season (such as millet and cowpeas in 2021), due to factors such as the Covid-19 pandemic.

### Potential evidence for future consideration

The following potential evidence could indicate whether the price seasonality mechanism is operational in the WRS and will sustain in the medium to long term:

- SHF/warehouse operators storing in competitor warehouses cite that they have been able to take advantage of price seasonality through WRS.
- Storage take-up is not large enough to change the general equilibrium and smooth out prices throughout the year in the medium term.

### Takeaways

**Goal:** Crop prices generally increase between harvest and non-harvest seasons and this mechanism will sustain in the medium to long term in Senegal.

**Expected outcome:** Goal is **likely** to be achieved.

**Rationale:** Price analyses and interview data from across stakeholders offer some evidence that crop prices across value chains generally increase between harvest and non-harvest seasons. Given the current scale and ambition of the five-year competition, we think the competition is unlikely to induce so much storage that it noticeably reduces the variation in prices. Also, price changes do not occur in a predictable manner across value chains and years, implying some risk to storage for SHF.

## 4. Findings: Competition Design and Implementation

Since the competition's official launch in November 2021, our team has closely followed the PM's implementation of the competition and has begun investigating the effectiveness of competition incentives (as devised in the design process). The following section shares initial evidence on competition design and implementation, with a focus on the prize structure, prize allocation and the PM's coordination with other stakeholders so far.<sup>41</sup> We acknowledge that some of these findings are influenced by the fact that the WRS is still nascent in Senegal and that project implementation is in its early stages. The report therefore reflects the current state of the project and the viewpoints of project stakeholders at the time this report was conceived.

In addition, our PT approach explores how the competition's implementation has fared from dignity and gender perspectives. On the one hand, we utilize the dignity lens to better understand if competition participants feel that their dignity has been respected by the competition implementers.

<sup>41</sup> The Senegal Storage-Based Finance Prize Business Plan developed by the Secretariat provides further contextual information on the prize design (p. 24) and the PM's responsibilities (p. 66).

On the other hand, we aim to analyze the extent to which the competition has been able to advance gender outcomes, as intended in the competition design. Specifically, we seek to gather preliminary information on the gender breakdown of potential competitors, including their affiliated SHF, and the gendered barriers facing these actors.

## 4.1 Competition design

As mentioned in Section 3.2, **Phase 1 prizes do not seem likely to encourage investment in warehouse upgrading if implementation remains the same.** Given that warehouse operators licensed through the WRS pilots, including those preselected by AgResults, did not need to invest in storage upgrades to participate (other than minimal expenditures related to equipment), it appears that those operators would have joined the competition regardless of the Phase 1 prize incentive.

## 4.2 Competition implementation

**The opaque selection process for competitors could be a barrier to participation and investment in storage upgrades prior to participation.** Some warehouse operators cited the need for more communication regarding the competition.<sup>42</sup> The preselection process (as explained in Section 1.3.1) also added additional barriers to participation in the competition, including requiring the approval of competitors by LBA – the one FI engaged in the competition. These factors combined may further impede warehouse operators from applying and/or participating in AgResults.

**The PM's collaboration with one CM for all competition participants may disincentivize operators' participation if other CM are not included.** Given that the PM is only working with Ace Global (see Section 1) – Procontrole and EGF have not been involved in the competition. As a result, all warehouse operators selected by the competition and eligible for Phase 1 prizes up to this point have signed a contract with Ace Global. The result is that warehouse operators have not been able to negotiate between CM to get a better price or a more convenient agreement. For example, one warehouse operator – who preferred to partner with Procontrole given previous experience collaborating with the CM – was obliged to partner with Ace Global through the competition and open a new bank account (with the Ace Global-partner FI) in order to participate.

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<sup>42</sup> For example, one operator mentioned that they would like to have more clarity on the exact criteria used for selection, and to know if/when they would be selected.

### 4.3 Dignity lens<sup>44</sup>

**For warehouse operators that have interacted with AgResults implementers, a majority seemed to feel that their dignity was respected.**<sup>45</sup> These operators considered interactions with the PM to be respectful and believed that their questions and concerns were addressed. Furthermore, they found that implementers were responsive and professional, and did not mention any conflict or challenges regarding their interactions with the PM.

**However, some warehouse operators surveyed did not consider those interactions respectful or did not feel that their questions and concerns were addressed.** In these cases, operators were not content with the level of information or support received by AgResults implementers regarding their participation in the competition and expressed concern about the lack of clarity regarding the competition's selection process. Furthermore, ORSRE representatives did not feel that decisions regarding the competition's design and implementation (i.e., prize allocation to PO rather than SHF) took into consideration the regulator's perspective and ambitions.

As the competition progresses and more participants join, our PT will track operators' perceptions of their dignity vis-à-vis the competition. Given that awareness of the competition and interactions with the PM were limited at baseline, we expect to gather more substantive evidence on respondents' perceptions of dignity in follow-up evaluations.

### 4.4 Gender lens

Regarding gender breakdown, **1 out of 9 cashew warehouse operators and 3 out of 17 groundnut warehouse operators which have been preselected by the competition were operated by women.**<sup>46</sup> Overall, participation of female warehouse operators in the competition was limited, which may stunt the competition's progress towards advancing gender outcomes. In addition, the percent of female SHF (out of total SHF affiliated with the warehouse operator's PO) was 34% on average, according to operators able to respond.<sup>47</sup> As the competition progresses and our team launches our IE, we will track female SHF participation in the competition based on data collected at the SHF-level to provide more robust estimates on female participation across regions and value chains.

<sup>44</sup> For further information on IDinsight's approach to dignity, please visit **IDinsight's Dignity initiative**.

<sup>45</sup> We have measured dignity by asking respondents whether they feel as if their interactions with the PM have always taken into consideration their situation and needs in a respectful fashion. We also asked respondents if they felt that PM were responsive to their questions and concerns regarding the competition.

<sup>46</sup> We were not able to find any data at national level for gender distribution of warehouse ownership/PO leadership to understand how this compares to national average of women participation in the storage sector.

<sup>47</sup> 20 out of 31 warehouse operators had information available for this question.

In terms of gender-based barriers, **initial evidence suggests that women SHF face additional burdens in accessing finance compared to men SHF.** Some warehouse operators stated that women SHF face more difficulty obtaining the collateral needed for loans, since traditional collateral (e.g., physical property) are typically owned by men. Furthermore, some warehouse operators claimed that women SHF have less information on how to access and open a bank account than men SHF. While the first barrier may be addressed through participation in the WRS (i.e., women SHF have direct access to collateral through WRS), a lack of familiarity with the banking sector may impede women SHF from directly participating in the system.

## 4.5 Recommendations

The following recommendations outline a few steps that could be taken to improve competition implementation moving forward.<sup>48</sup>

### **Recommendations on implementation:**

- **Implement transparent and well-communicated selection criteria**, such that potential competitors understand if they are eligible, and all eligible warehouses have the opportunity to join the competition.
- **Partner with numerous stakeholders** (e.g., FI and CM) through the competition to avoid unnecessary exclusion of potential competitors based on partner practices, such as:
  - *FI refuses to approve financing for warehouse,*
  - *CM offers monopolistic pricing to warehouse.*
- **Collaborate more closely with the ORSRE** to address their concerns with the competition as much as possible given their vital role in licensing potential competitors.
- **Continue targeting female warehouse operators through the EOI and selection processes** to ensure better gender balance between competitors.

## 5. Implications for upcoming baseline Impact Evaluation

Based on ongoing discussions with the PM, the AgResults competition in Senegal is expected to launch Phase 1 prizes for groundnut, maize, millet, and cowpea warehouses by September 2022. Given this timing, our team proposes beginning our baseline IE for all value chains in September 2022. Provided that selected competitors have been identified and licensed and that Phase 1 prizes are on track to be distributed to competitors in the groundnut, maize, millet, and cowpea value chains by September 2022 (as expected by the PM), we propose to conduct our baseline evaluation for these value chains

<sup>48</sup> We have focused our recommendations on implementation rather than design to provide actionable insights to the PM (and other partners) at this stage. However, we plan to make recommendations on design and implementation in our follow-up reports.

just prior (and during if needed due to logistical constraints) to harvest season for limited constraints on SHF respondents. We will subsequently collect our data on cashew value chain SHF in the following months (e.g., October/November). This option will allow our team to collect data on SHF affiliated to all selected competitors and potential control warehouses across value chains at this stage in the competition before storage through the WRS may increase the following year.

If launching our IE baseline in September 2022 is not feasible (e.g., competitors have not been selected by that point), we will discuss options regarding our baseline IE timeline with members of the Steering Committee, including conducting a rolling baseline. It is important to note that if a relatively small number of warehouses are selected for the competition, we may not have sufficient power to detect the competition's treatment effect.

Taking into consideration the feedback from the March 2022 Steering Committee meeting that our team should consider all potential storage models as part of our impact evaluation, we intend to survey SHF affiliated with warehouses that use all five storage models described in Section 3.7. Having said that, we intend to oversample SHF affiliated with warehouses that utilize models which directly benefit SHF. We propose this approach in order to capture, as much as possible, any changes in SHF revenues from crop sales, given our expectation that SHF associated with these storage models are more likely to experience a detectable increase in revenues over time.

In addition, given the Steering Committee's interest in understanding how the competition will fare from one value chain to another, and the PM's sequencing of competitor selection between cashew and groundnut value chains, we seek to include both value chains in our evaluation. We hope to be able to draw some lessons from comparing the performance of the two value chains but may not have sufficient power to quantitatively assess competition effects by value chain.

## 6. Annex

### 6.1 Process tracing overview from Evaluation Design Document

The following section is an excerpt from our Evaluation Design Document (EDD) that explain the process tracing approach.

Process Tracing (PT) describes an evaluation approach that aims to make descriptive and causal inferences. In the case of the AgResults Crop Finance project, we propose PT as a method through which to investigate the causal links laid out in the ToC and produce a descriptive analysis of the project's direct and indirect effects. Our PT approach will rely on qualitative and quantitative data taken from the KII and document review respectively. Through analysis of this data, we hope to validate/refute assumptions in the ToC, and better understand the overall landscape of the storage sector in Senegal. Based on our understanding of the crop warehouse sector in Senegal, different storage models exist across regions and crop value chains – PT will allow us to look into how these models operate in practice, and which models (if any) offer the most promise to improve SHF livelihoods. In particular, PT will unpack the competition's impact on private sector involvement in the warehouse sector and WRS (EQ1), as well as the scalability and sustainability of the competition's effects (EQ4).

To achieve this, we will conduct PT through three lenses:

- **Causal** – Our team will collect and examine evidence on how the project advances (or not) its own stated goals on private sector involvement in the development of warehouse storage and WRS. Examples of potential evidence for each EQ are included below. Analysis of this evidence will reveal to what extent causal pathways outlined in the ToC are realized or not, and whether factors not included in the ToC had any influence over outcomes<sup>49</sup>. The causal lens is particularly relevant to EQ1 to better understand what (competition) factors influence private sector involvement in the warehouse sector, but will also shed light on EQ4, notably the competition's direct role (if any) in encouraging the sustainability/scalability of the WRS model.
- **Descriptive** – Our team will also use a descriptive analysis of qualitative/quantitative data to examine how contextual factors in the competition affect project outcomes (e.g. regulatory environment for WRS or existing storage models). This descriptive approach will complement the causal lens to inform our understanding of the storage sector context in Senegal, and the competition's relationship to existing initiatives/developments within the sector. The descriptive lens will apply to both EQ1 and EQ4. It will also guide our quasi-experimental impact evaluation used to answer EQ2 and EQ3.
- **Prospective** – Our team will conduct a prospective analysis of evidence from descriptive and causal approaches to understand the likelihood of project effects after the conclusion of the competition. We will draw on our data related to the sustainability of project efforts to infer

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<sup>49</sup> Unlike an experimental or quasi-experimental approach, the counterfactual scenario (i.e., what would have happened in the absence of the competition) is not constructed using data from a comparison group that does not receive the intervention. Instead, PT will allow us to construct the counterfactual based on stakeholders' projections of their likely behavior, expected outcomes in absence of the project and observations of other influences.

the potential for sustained impact in Senegal’s storage sector and WRS development. Prospective analysis will focus on EQ4.

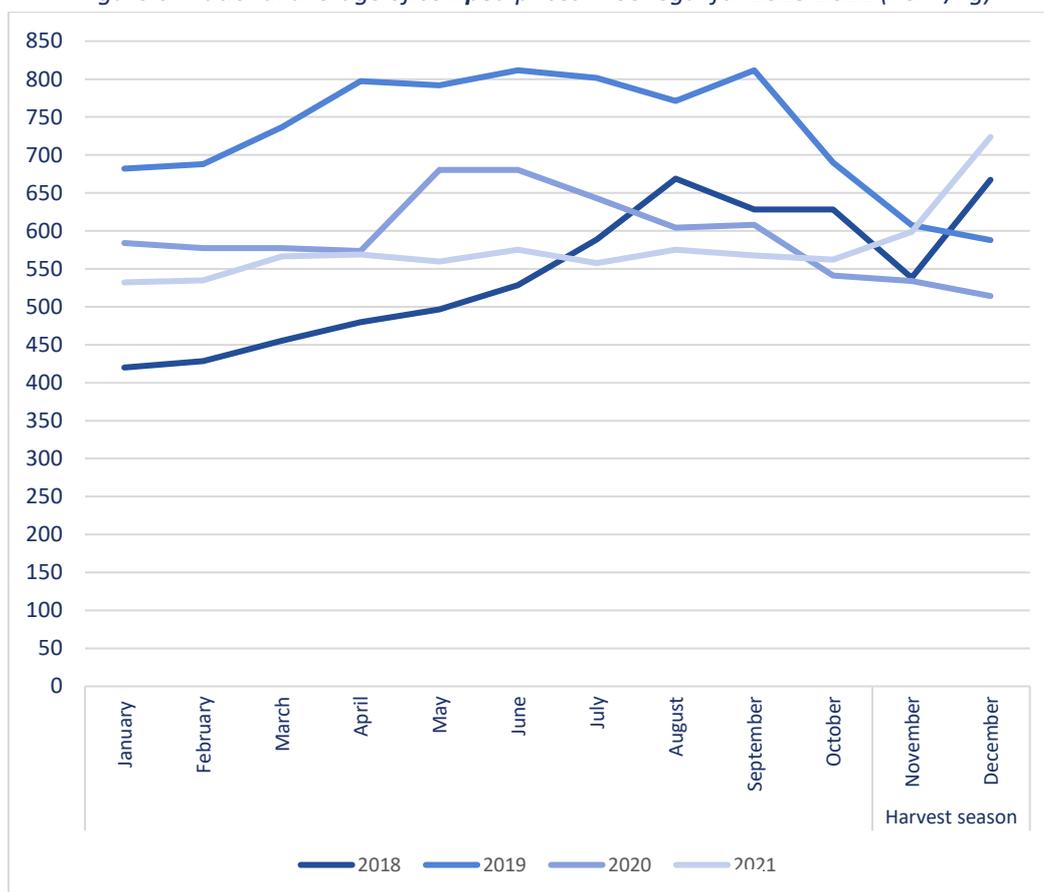
To carry out these different elements of process tracing, our team will identify the following:

1. Intended outcomes and expectations of how these outcomes change over a period of time,
2. Diagnostic evidence in favor and/or against the causal claim of the intervention<sup>50</sup>,
3. Evidence needed to rule out potential influencing factors other than the intervention.

## 6.2 Crop price analysis

The following data comes from the Agence Nationale de la Statistique et de la Démographie<sup>51</sup> and the commercial advisory service N'kalô<sup>52</sup> in Senegal. The prices described in the figures below are local prices across five value chains. To compare price fluctuations between harvest and non-harvest seasons in these figures, below are the harvest season for each value chain of interest.

Figure 6: National average of *cowpea* prices in Senegal for 2018-2021 (FCFA/kg)



<sup>50</sup> According to Collier (2011), this evidence will be used to diagnose (i.e. validate/refute) the causal claims made in the ToC about how the competition impacts outcomes directly (e.g. phase 1 and 2 prizes will lead to more storage availability/accessibility).

<sup>51</sup> For reference: <https://senegal.opendataforafrica.org/syyzsl/prix-des-produits-agricoles>

<sup>52</sup> For reference: <https://www.nkalo.com/home>

Figure 7: National average of **millet** prices in Senegal for 2018-2021 (FCFA/kg)

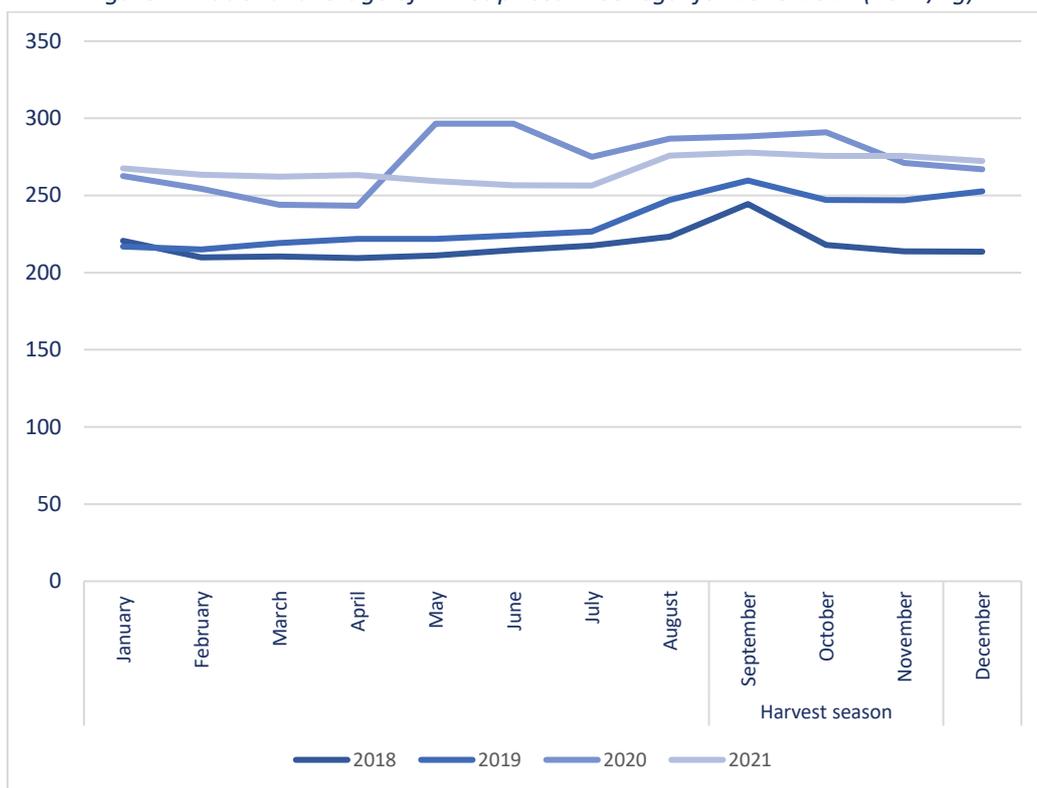


Figure 8: National average of **maize** prices in Senegal for 2018-2021 (FCFA/kg)

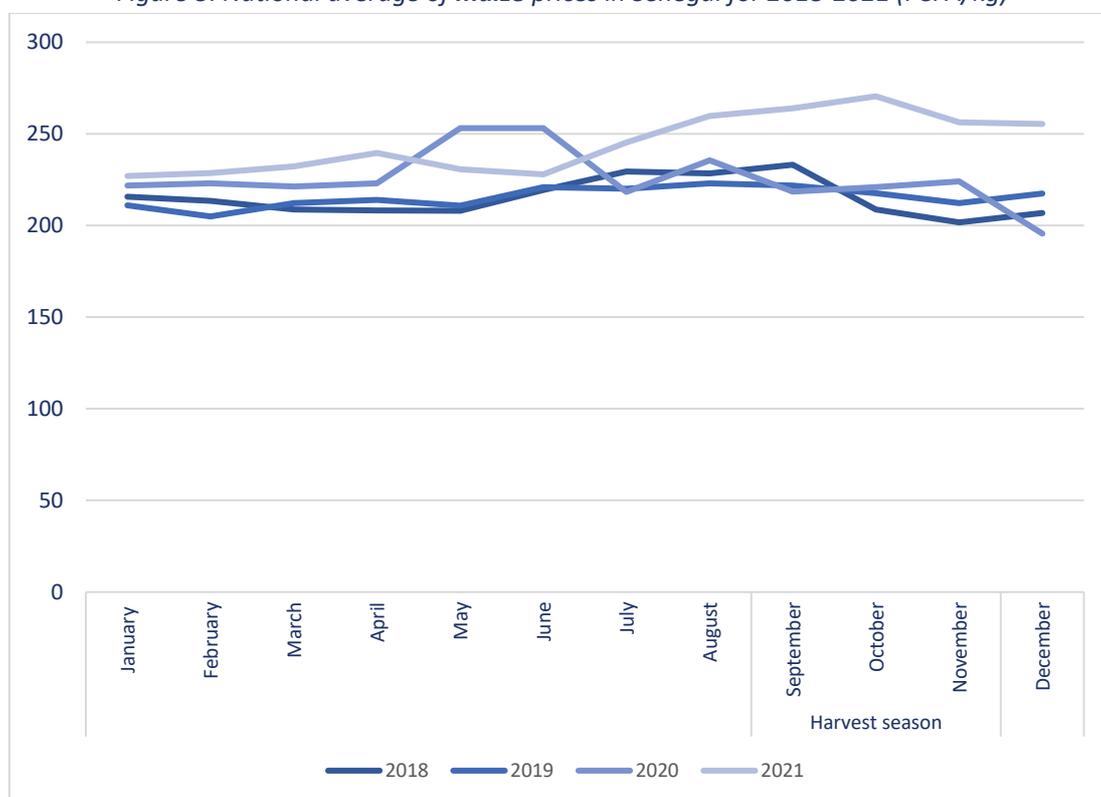


Figure 9: National average of **groundnut (unshelled)** prices in Senegal for 2018-2021 (FCFA/kg)

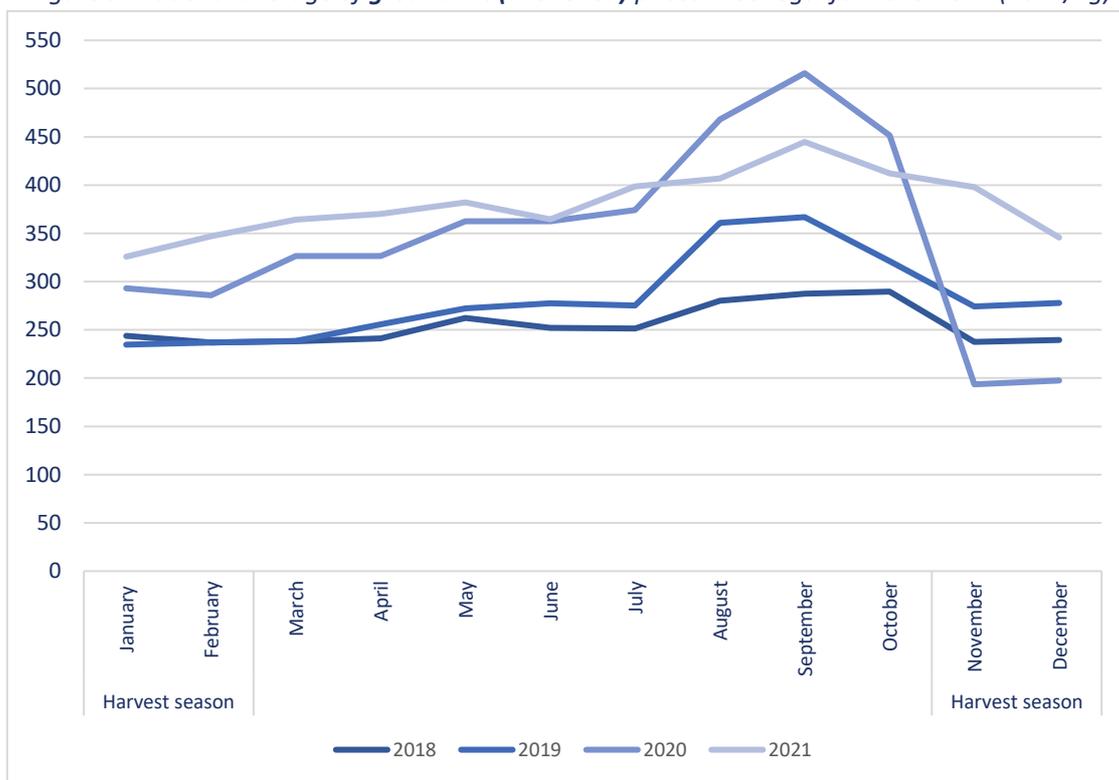


Figure 10: National average of **groundnut (shelled)** prices in Senegal for 2018-2021 (FCFA/kg)

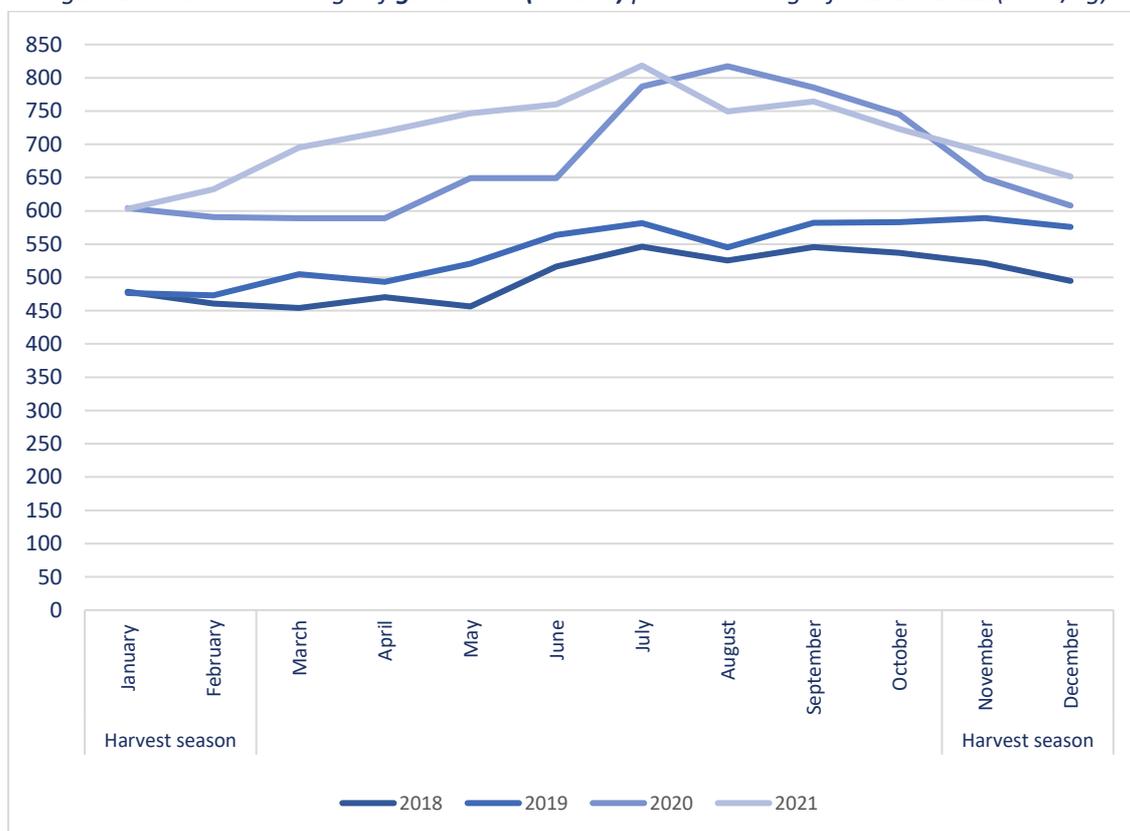
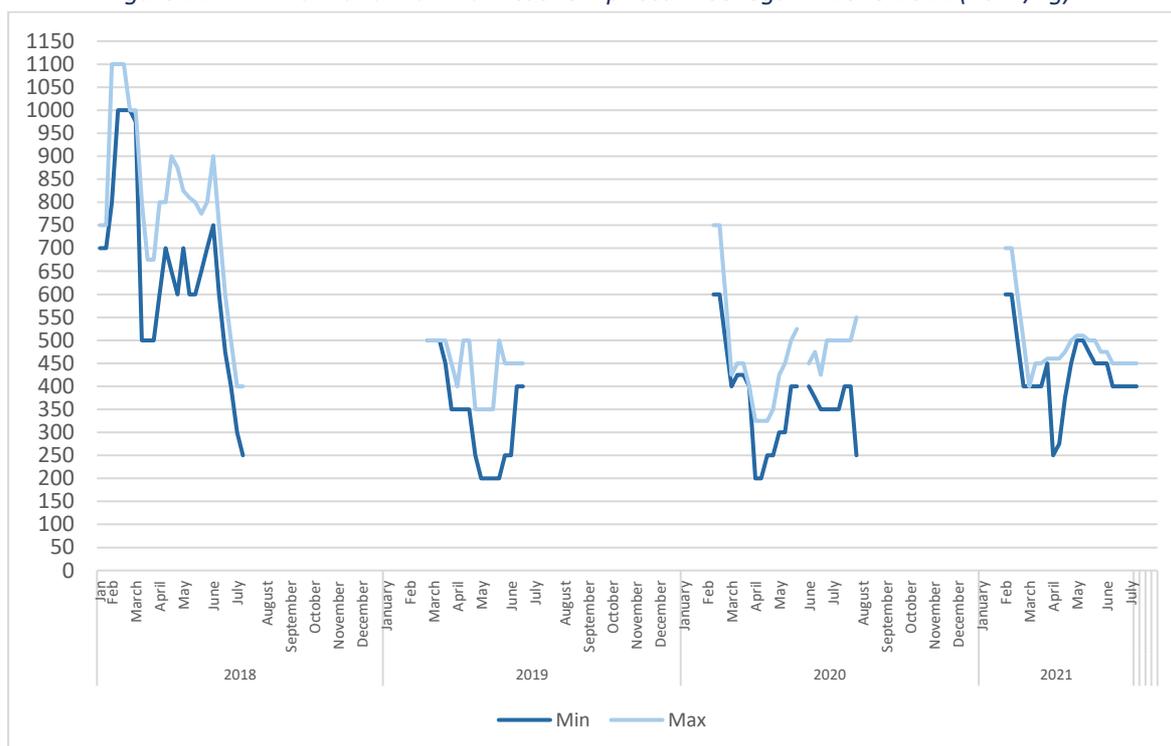


Figure 11: Minimum and maximum *cashew* prices in Senegal in 2018-2021 (FCFA/kg)<sup>53</sup>



<sup>53</sup> Weekly minimum and maximum market prices for a kilo of well dry and cleaned harvested cashew nut, combining Sokone and Casamance areas, provided by N'Kalô during harvest season. Between August and January, international exporters and local traders are not active in the country and transactions are fewer.