



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



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## LASTING ROOTS: NAATAL MBAY AND THE INTEGRATED FINANCE MODEL IN SENEGAL

*Part of the MSP Ex-Post Study Series*

FEED THE FUTURE MARKET SYSTEMS AND PARTNERSHIPS ACTIVITY

AUGUST 2023



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*The Feed the Future Market Systems and Partnerships Activity is advancing learning and good practice in market systems development and private sector engagement within USAID, USAID partners, and market actors. For more information, access to technical resources, and opportunities to engage, visit [www.agrilinks.org/msp](http://www.agrilinks.org/msp).*

## ACRONYMS

AFD	Agence Française de Développement (French Development Agency)
BNDE	Banque Nationale pour le Développement Économique (National Bank for Economic Development)
CFA Franc	Franc of the Financial Community of Africa
CSC	Contre-Saison Chaude (Hot Dry Season)
DSD	Disrupting System Dynamics
FSP	Financial Service Provider
GoS	Government of Senegal
IFM	Integrated Finance Model
JICA	Japanese International Cooperation Agency
KII	Key Informant Interview
LBA	La Banque Agricole (The Agricultural Bank)
MEL	Monitoring, Evaluation and Learning
MSA	MarketShare Associates
MSD	Market Systems Development
MSP	Market Systems and Partnerships Activity
PCE	Projet Croissance Économique (Economic Growth Project)
RTI	Research Triangle Institute
SRV	Senegal River Valley
TPHA	Third-Party Holding Agent
TPHS	Third-Party Holding System
USAID	United States Agency for International Development
USD	United States Dollar
WRS	Warehouse Receipt System

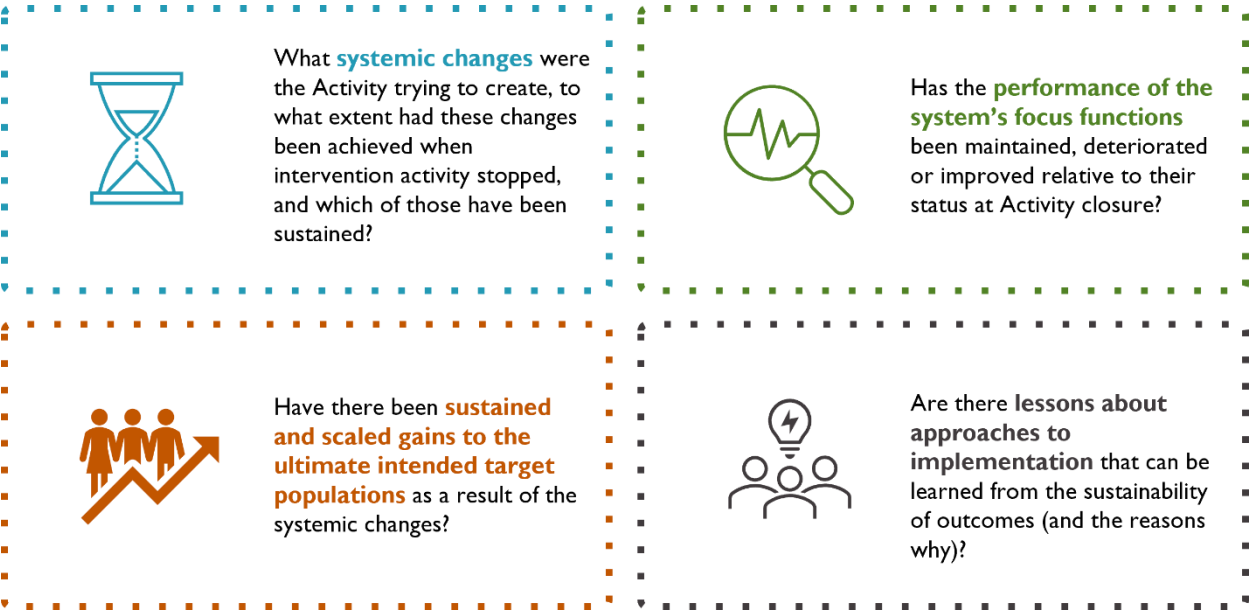
An exchange rate of 1 USD = 600 CFA Francs has been used for the purpose of calculating the figures used in this report.

# EXECUTIVE SUMMARY

This report addresses the well-recognized evidence gap<sup>1</sup> on the longer-term impacts created by market-driven programming; specifically, programming influenced by market systems development (MSD) principles. It does so by presenting the findings of an ex-post study conducted three and a half years after the close of USAID’s Feed the Future Senegal Naatal Mbay Activity (hereafter Naatal Mbay) in 2019. It examines the **scale and sustainability of changes resulting from Naatal Mbay’s introduction of an integrated finance model (IFM)** – described in **Error! Reference source not found.** below – in the domestic rice sector. This study is one in a series of ex-post evaluations that are being conducted between 2023-2026 on USAID-funded MSD interventions around the world.

This study focused on four questions, noted below in Figure 1. These were addressed using a mix of desk research, 122 key informant interviews with market actors and other stakeholders remotely and in Senegal, focus group discussions with 26 rice producers networks in Senegal, and a validation workshop with USAID/Senegal, implementing partner staff and market actors. Findings were analyzed leveraging the [Disrupting System Dynamics \(DSD\) framework](#) (see Figure 4 in the body of the report) as an analytical tool for understanding systems change.

Figure 1: Ex-post Study Research Questions



<sup>1</sup> For example, the BEAM Exchange’s periodic evidence mapping of the results of MSD programming points to the lack of ex-post evidence on the enduring impacts of the approach.



## The Legacy of Systemic Change

The study examined four areas that demonstrated potential for systemic change at the end of Naatal Mbay. Three and a half years later, **three systemic changes had endured and thrived, while one did not**. Drawing from the DSD framework, these changes included systemic disruptions and “stickier” changes in networks and norms as Figure 5 in the body of the report visualizes.

- ✓ **Market actors accept signed contracts and secured crop as collateral on which to provide increased amounts of credit at reduced risk.** Prior to Naatal Mbay, value chain actors’ limited access to finance severely curtailed the rice sector’s growth. Naatal Mbay worked with several partners to introduce a financial innovation that lowered the risk and thus increased the availability of financing for both farmers and rice millers. By program close in 2019, use of the integrated finance model had expanded in the irrigated rice value chain in the Senegal River Valley (SRV). Following 2019, the norm that crop is a viable collateral for agricultural lending strengthened, with financial service providers (FSPs) continuing to accept signed contracts and secured crop to provide increased amounts of credit at reduced risk.

The third-party holding system (TPHS) that Naatal Mbay introduced, in which external firms monitor the warehouses in which crop is stored and used as collateral for lending, has now become widely used in Senegal. From being applied in the rice and peanut crops at program closure, the same two FSPs are now securing their lending with agricultural commodities in **five additional value chains** including cashew, fertilizer, salt, sesame and millet. Hence, while the number of rice processors accessing the IFM remains steady, there has been a **37% increase in companies who are using agricultural products as collateral to secure lending** across the entire agricultural sector. Moreover, there has been a **377% increase in lending across all value chains secured by inventory collateral** between 2019 and 2022 to USD 88.4 million. An unanticipated systemic change is that a new collateral-based lending system in which farmers can borrow up to 80% of the value of several different crops following harvest is using the same third-party holding system infrastructure that Naatal Mbay introduced.

- ✓ **Contracting between producers and processors is now a widespread practice in the rice sector.** Prior to Naatal Mbay, the lack of a coordinated market system was one of the perennial challenges constraining Senegal’s agricultural growth. Rice marketing was highly informal, characterized by an absence of marketing and formal production contracts. Naatal Mbay encouraged the establishment of formal contracts between producers and processors and a more organized process to aggregating and purchasing paddy. By program closure, contracting and organized aggregation had become widespread practices in the rice sector and had **contributed to the emergence of 60 new rice millers** operating in the Senegal Rice Valley. As of early 2023, investments in new rice processing plants and upgrading existing plants continue to grow. Contracting within the sector has been institutionalized by the Government of Senegal (GoS) as a requirement for farmers to access production subsidies. Trust and cooperation have grown between market actors.

✓ **Senegalese rice effectively competes in higher value local markets.** Prior to Naatal Mbay, domestically produced rice was characterized by a heterogeneous mix of whole and broken grains, high impurity content and inconsistent humidity rates. These deficiencies made local rice inferior to imports and thus sold at low prices for consumption by rural consumers. To enable domestic rice to reach higher value urban markets, Naatal Mbay improved quality across the value chain. It supported producer networks and processors to develop and apply a pragmatic and effective quality assurance framework. By program closure, the adoption of quality standards had become widespread in the rice value chain in the SRV. As market actors upgraded and enhanced the quality of their products, a normative change occurred around the quality of domestic rice. This resulted in a considerable increase in local rice consumption in urban areas. As of early 2023, quality standards continued to be applied by market actors at similar levels to program closure and had become a standard component of processor contracts with farmers. The norm among Senegalese consumers that domestic rice is as desirable as imported rice continues to strengthen. This is demonstrated through Senegal being one of only three West African rice producing countries (out of 15) to have reduced the proportion of rice they imported between 2009 and 2019.

✗ **The enhancement and digitalization of information management systems among unions of farmer cooperatives has not been sustained** to the extent Naatal Mbay hoped. Prior to Naatal Mbay, the majority of farmer cooperatives lacked the necessary information systems to effectively manage their agricultural inputs orders, coordinate sales, monitor and evaluate members' performance, and estimate total production levels to facilitate efficient sales. Naatal Mbay worked with producer networks to introduce self-managed digital data systems specifically tailored to their management needs, compatible with their technological context, and capacity and skills. While the gradual roll out of these digital tools resulted in impressive uptake of data management systems during the lifetime of the program – with the number of databases managed by local networks increasing from 10 in 2012 to 123 in 2018 – this has not been sustained beyond the lifetime of the program largely due to the cost. Nevertheless, producer networks continue to collect key data to inform production and marketing decisions.



### Performance of Systems Functions

This study focused on the performance of four functions within the rice system (see Figure 2), of which **one has improved considerably, two have remained stable, and one has deteriorated slightly since Naatal Mbay's closure.**

The **purchasing and consolidation of rice** by buyers from multiple smallholder farmers has continued to function effectively and efficiently. Rice processors secure stock via contracts with farmer organizations, who continue to efficiently aggregate supply. Contracts bolster trust among market actors.

Figure 2: Four Rice System Functions Focused on In This Study



**Access to production and purchase finance**

has further improved. While direct access to credit for rice farmers via the IFM declined from 2020-2021 due to difficult growing conditions and resulting defaults, rice processors are increasingly offering financing to farmers directly. They are using their own capital and/or accessing loan capital from FSPs to do so. The application of the IFM in other value chains has reduced FSPs’

default rates and thus their lending risk, resulting in enhanced willingness to lend. Moreover, the third-party holding system introduced by Naatal Mbay has been used to secure a new warehouse receipt system (WRS) in which farmers in other major agricultural crops can borrow up to 80% of the value of their crop. In 2022, at least USD 5.5 million was lent under this new model.

**Crop standard setting and enforcement** continues to be included in contracts and applied by both rice processors and the third-party holding companies that are monitoring rice stocks. Surplus demand for paddy does, however, create pressure for processors to relax their standards to have sufficient rice to mill.

**Commodity information collection, sharing and learning** has continued, but inconsistently among market actors. Information is not being widely shared between market actors except to help estimate quantities of crop to be financed.

The focus functions have proven to date to be **resilient** to large shocks. Notably, they endured the COVID-19 pandemic and other shocks such as erratic weather patterns and the emergence of pests and diseases occurring between program closure and the ex-post evaluation. A supportive factor was the chronic deficit of domestic rice production and surplus demand for rice in Senegal, which has caused the government and rice millers to be extremely accommodating of rice farmers’ needs.



For the **target population of rice farmers** in the Senegal River Valley, **income gains have been sustained since program close**. This has been driven by the increase in the sale price of rice, which has balanced a reduction in productivity due to COVID-19 and climate-related shocks. Double cropping of rice, which Naatal Mbay had hoped would increase incomes but had not been realized at program



closure, continues to not be widely practiced. The comparatively higher returns of growing horticulture in the winter season, delays in credit approval and disbursement, and shortages of harvest mechanization services at peak times all have impeded this. However, the shift to mostly growing rice during the summer season when farmers can obtain double the yields of the rainy winter season, which the IFM had enabled via better access to finance and had occurred by the end of Naatal Mbay, continues to this day.

Access to finance for target populations remains strong. COVID-19 and climate-related shocks caused some farmers to be unable to repay the loans they acquired through the IFM, and thus lose access to IFM credit in subsequent seasons. This resulted in a reduction in the number of farmers accessing seasonal credit directly through the IFM. Nevertheless, most farmers no longer eligible for loans with IFM-affiliated FSPs were able to access credit through other alternatives, including via processors directly providing input credit to farmers and accepting repayment in paddy. No significant gender differences in results were observed. **Overall, farmers report significant satisfaction with the IFM**, and the benefits accrued from it.



### Implications for Programming

Naatal Mbay took a relatively light-touch approach to facilitation that avoided subsidizing equipment and sought to build ownership among local market actors. There are several implications for programming in Senegal and the MSD and economic development communities:

1. The experience of Naatal Mbay vis-à-vis the many other programs that have focused on the rice sector in Senegal suggests that **a predominant focus on farmer productivity will rarely create necessary changes alone**. Leveraging market opportunities has a more powerful influence on shifting behaviors.
2. The approach taken by other donor-funded programs in Senegal of **heavily subsidizing farmer infrastructure may create supportive conditions for change (as with the building of crop storage warehouses or investing in large-scale irrigation) but often leaves little lasting benefit (as with the subsidization of tractors)**. Such investments on their own rarely help a system to function more effectively, and typically, their impacts are short-lived. Supporting the development of viable business models is critical. Moreover, Naatal Mbay made clear that **private capital (including within the informal sector) will invest in agriculture when opportunities exist**.
3. When designing MSD programs, Naatal Mbay reinforces the need to **start with the market** to leverage existing incentives for behavior changes. This requires **working with partners that have the right incentives for change**, which for Naatal Mbay was existing processors, many of whom were already operating in the sector informally and interested in selling to more lucrative markets. Small businesses operating in the informal are **too often overlooked as sources of capital and innovation**. The government is a critical partner in Senegal that can provide significant support to scaling successful innovations.
4. Naatal Mbay demonstrates that systemic change often happens when **successful models build on a series of earlier successes and pre-conditions**. **Existing, successful models are often**

**good candidates to be adapted**, in an “exaptive design process<sup>2</sup>” that repurposes core practices and services already being applied elsewhere and uses a **co-development process** with key market actors. **Change often spreads within a system by people bringing ideas with them.** The IFM largely spread via program staff from Naatal Mbay and PCE moving on to the private sector and leadership in other USAID-funded agricultural activities. Nevertheless, knowledge exchange within organizations may happen slowly if at all and thus are worthy of programmatic focus. The same is true of **systems change, which takes time.** Naatal Mbay built on a series of changes that were introduced during PCE. The series of transformations created by the two programs would not have been feasible in PCE’s five-year funding window alone.

5. Naatal Mbay also shows that **collateralizing agricultural commodities can drive change in agricultural finance systems.** These commodities can represent a **significant but hidden source of collateral** that reduce risk to borrowers and hence greatly enhance agricultural lending when supportive legal frameworks are in place. These models require seeing **finance as a tool for trade facilitation** that doesn’t maximize the profit of a single loan but rather aims to optimize transaction speed in a high volume, low margin business model. Maintaining access to this source of financing **creates strong disincentives to defaulting** that are comparatively much more powerful than those related to honoring the parallel sales contracts.

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<sup>2</sup> <https://en.wikipedia.org/wiki/Exaptation>

# INTRODUCTION

Market Systems Development (MSD) is gaining increasing recognition within USAID as a development approach with great potential to lead to sustainable and inclusive economic growth. This approach aims to “*build the capacity and resilience of local systems, leveraging the incentives and resources of the private sector, ensuring the beneficial inclusion of the very poor, and stimulating change and innovation that continues to grow beyond the life of the program.*”<sup>3</sup> Despite this, because of the lack of ex-post evaluations on MSD programs, and the complexity of monitoring and assessing contribution to systemic change more broadly, there is limited formal evidence from robust evaluations that market-driven approaches actually lead to sustainable and scalable outcomes over time.

In recent years, ex-post evaluations have emerged as a useful approach to assess the durability of results and systemic changes created by MSD approaches, following their completion. Yet, only a few of these evaluations have been conducted to date.<sup>4</sup> This evidence gap is particularly problematic, given the increasing adoption of MSD approaches by USAID and implementers.



## What is an Ex-Post Evaluation?

An ex-post evaluation is defined as a type of evaluation that examines a strategy, project, activity, or intervention at least one year, or several years, after it has ended. It can be used to answer questions about whether and how interventions and/or outcomes are sustained and what factors and contexts help or hinder USAID interventions and sustainable development outcomes.

Source: USAID (2021), Discussion Note: Ex-post Evaluations

USAID, through the Feed the Future Market Systems and Partnership Activity (MSP), has endeavored to change this by supporting a series of ex-post evaluations of MSD programming. These studies aim to evaluate the sustainability and scale of outcomes from specific systemic changes catalyzed during USAID-funded Activities that have applied key features of an MSD approach. The overarching objectives of these evaluations are to build the **evidence base across a range of contexts, while also contributing to improved methods for conducting future MSD ex-post evaluations.**

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<sup>3</sup> Campbell, Ruth. [A Framework for Inclusive Market System Development](#). Washington: USAID Leveraging Economic Opportunities (LEO), 2014.

<sup>4</sup> Examples include: MarketShare Associates. [Scaling Impact: Cambodia MSME Ex-Post Assessment](#); and ACDI/VOCA. [Scaling Impact: Zambia PROFIT Case Study](#). Washington: USAID Leveraging Economic Opportunities (LEO), 2016, and Khatiwada, Lila Kumar and Kevin Hans Waitkuweit. [Ex-post Evaluation of USAID/Uganda’s Feed the Future Commodity Production and Market \(CPM\) Activity](#), 2021. More examples at the blog post, [The Great Opportunity and Challenge of MSD Ex-Posts: 4 Takeaways from a Rapid Harvest of Insights](#). (2021).

## Feed the Future Market Systems and Partnerships Activity

[The Feed the Future Market Systems and Partnerships \(MSP\) Activity](#) aims to advance learning and good practice on market systems development (MSD) and private sector engagement (PSE) within USAID (Washington, D.C., and Missions), USAID implementing partners, and market actors by providing and improving upon the evidence, capacity, tools, technical assistance, and services required to design, implement, monitor, and evaluate activities. MSP supports USAID to bring about a major cultural and operational transformation by integrating PSE across all activities while deepening MSD and facilitative approaches across the program cycle.

Using a criteria-based selection process, MSP assessed 19 potential Feed the Future Activities, and ultimately selected three that were deemed most suitable as case studies for these ex-posts. One of which includes the Feed the Future Senegal Naatal Mbay Activity. Naatal Mbay, implemented by RTI International from 2015 to 2019, was a large-scale market systems development program that aimed to increase the agricultural sector's contribution to economic growth through a bottom-up and inclusive, private-sector led value chain approach. The program targeted the rice, maize, and millet value chains in the Senegal River Valley and the South Forest Zone.

Rather than evaluating the entire Activity, this ex-post evaluation focuses on a particular intervention area or systemic change objective. This was necessary given available resources and also reflects that Naatal Mbay worked across multiple intervention areas, some of which did not necessarily employ a systemic approach. In the context of Naatal Mbay, **this ex-post evaluation focuses on an innovative integrated financing model that connects market actors in order to value and pledge paddy rice to secure credit.** The introduction of this model was one of Naatal Mbay's most prominent interventions and was launched with the intent of significantly reducing the risks, difficulties, and uncertainties associated with procuring paddy rice on the open market.<sup>5</sup>

## OVERVIEW OF NAATAL MBAY

### Context

Senegal's agricultural sector is the mainstay of the economy and a lever for inclusive growth, food security, employment, and poverty reduction. In 2021, it employed 77 percent of the workforce, representing 60 percent of the country's overall population. Nearly 70 percent of Senegal's rural population relied on agriculture as their primary source of livelihood<sup>6</sup>. Despite this, the sector only accounted for 15 percent of the country's GDP<sup>7</sup>. Limited arable land, poor soil fertility, significant reliance on rainfed agriculture, and insufficient access to inputs are among the key factors that constrain

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<sup>5</sup> Kula, Olaf, Charles Addo, MarketShare Associates, and Dan White. [Case Studies on Facilitating Systemic Change in Feed the Future: A Synthesis of Cases from Ghana, Senegal, Zambia and Rwanda](#). Washington: USAID Leveraging Economic Opportunities (LEO), 2016.

<sup>6</sup> World Bank, [World Bank Indicators](#), Employment in agriculture (% of total employment), 2021

<sup>7</sup> World Bank, [World Bank Indicators](#), GDP (current US\$), 2021

agricultural productivity. As a result, the country is critically dependent on imports for food security, importing up to 70 percent of its food.<sup>8</sup> This is particularly the case for rice, Senegal's staple food.

It is estimated that, on average, Senegalese consume 85 kilograms of rice per year, making the country one of the largest consumers on the continent<sup>9</sup>. Demand for rice is expected to continue to rise with population growth and increasing urbanization. Despite its prominent place in the consumption habits of Senegalese households, the country has for decades imported the majority of rice consumed. In response to this, the Government of Senegal has made rice self-sufficiency one of its key priorities, as highlighted in a number of development strategies, including its Plan Senegal Emergent strategy and the Programme d'Accélération de la Cadence de



*Bags of rice stored at a warehouse in Senegal.  
Photo Credit: Laura Courbois / MarketShare Associates*

l'Agriculture Sénégalaise. In 2014, The Government launched its Programme National d'Autosufficance en Riz – a rice self-sufficiency program – which aimed to drastically increase rice production through the construction of water infrastructure, the development of new irrigable land and the promotion of commercial rice cultivation. Although Senegal's rice production has nearly tripled since 2014, reaching 1.3 million tons in 2021, the country still imports 40 percent of the rice it consumes<sup>10</sup>. GoS and international donor support for the rice sector prior to the launch of Naatal Mbay generally consisted of farmer training, rice variety development, and investments in infrastructure including irrigation schemes, warehouses for storage, and equipment for mechanization.

### ***Activity Description***

It is within this context that Feed the Future funded two flagship programs in Senegal: the Economic Growth Program (Projet Croissance Économique or PCE) from 2009 to 2014 then Naatal Mbay (which means 'flourishing agriculture' in Wolof). These programs aligned their activities to support the Government's commitment to tackle food security and nutrition while creating the conditions for sustained and inclusive agriculture-led growth.

Naatal Mbay was tasked with scaling up and expanding, both in terms of beneficiaries and geographical coverage, proven technology and best practice packages for targeted cereal value chains: rice (both irrigated and rain-fed), maize, and millet. Program interventions focused on the Feed the Future zone of influence and aimed to reach 130,000 rural households, representing about 45 percent of the zone's 305,000 rural households. By facilitating improved access to finance, improving contracting

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<sup>8</sup> International Fund for Agricultural Development (IFAD), [Senegal Country Profile](#), 2023

<sup>9</sup> Glatzel, Katrin. [What can we learn from rising rice production in Senegal? Staple crops in Africa offer economic promise for rural youth](#). IFPRI Blog: Issue Post, 2018

<sup>10</sup> Dione, Ngouda and Elodie Toto. [Senegal hones its home-grown rice to cut dependence on Asian imports](#). Reuters: Commodities, October 20, 2022

arrangements, removing barriers to smallholder investment in improved inputs and technologies, and increasing access to production and market information, Naatal Mbay interventions aimed to increase incomes of rural smallholders as well as promoting small- and medium sized businesses.

Naatal Mbay built on the work of its predecessor program PCE, which embraced a sustainability-focused systems approach by working through partnerships with local value chain actors and farmer networks, financiers, and buyers to strengthen smallholder agriculture, and promote the creation of integrated, competitive supply chains to feed local and national markets. Most of the critical areas of this study were first introduced by PCE and then built upon by Naatal Mbay<sup>11</sup>.

Building on the foundation of both PCE and Naatal Mbay, the Feed the Future Senegal Value Chain Services Activity started in May 2022 and will operate until September 2027 with the aim of continuing to achieve greater scale and impact in the zone of influence. Also named Dooleel Mbay (which means 'strengthening agriculture' in Wolof) the activity plans to continue working in the rice sector, though its plans and strategy were still being determined at the time of the ex-post evaluation.

### *Innovation Rationale and Description*

Output market value chains are a frequent focus area of inclusive agricultural development. Contract farming and warehouse receipt systems are two commonly promoted models that can support a more structured, consistent and inclusive aggregation sales model for smallholder farmers while also providing opportunities for the private sector to grow and develop. Despite their strong potential, these models face sustainability and scalability challenges and often are only successful when adopted by a single apex buyer (often a parastatal institution).<sup>12,13</sup>

One of the most salient challenges in making these models work is the limited risk appetite of buyers and sellers to invest in the exchange. Both models require two-way trust: buyers need to trust that the seller will supply quality product on time and at a feasible volume; while sellers need to trust that the buyer will pay them a fair price for their product in a prompt fashion. In volatile, opaque and weak markets this trust tends to be in short supply, limiting how many players are willing to take a risk on



#### **Feed the Future Naatal Mbay**

**Date:** March 2015 to June 2019

**Prime:** RTI International

**Subcontractors:** IPAR, ASPRODEB, CNAAS, PlaNet Guarantee, and Dimagi

**Budget:** USD 24 million

**Intervention focus:** Cereal value chains (rice, both irrigated and rain-fed; maize; and millet) in the Senegal River Valley (SRV) and the Southern Forest Zone (SFZ)

<sup>11</sup> RTI. [Final Report: Feed the Future Senegal Naatal Mbay](#). 2019

<sup>12</sup> Champika, Jayamini and L.M Abeywickrama. [An Evaluation of Maize Contract Farming System in Sri Lanka: Adoption, Problems and Future Prospects](#). Tropical Agricultural Research Vol. 26 (1): 62 – 73, 2014

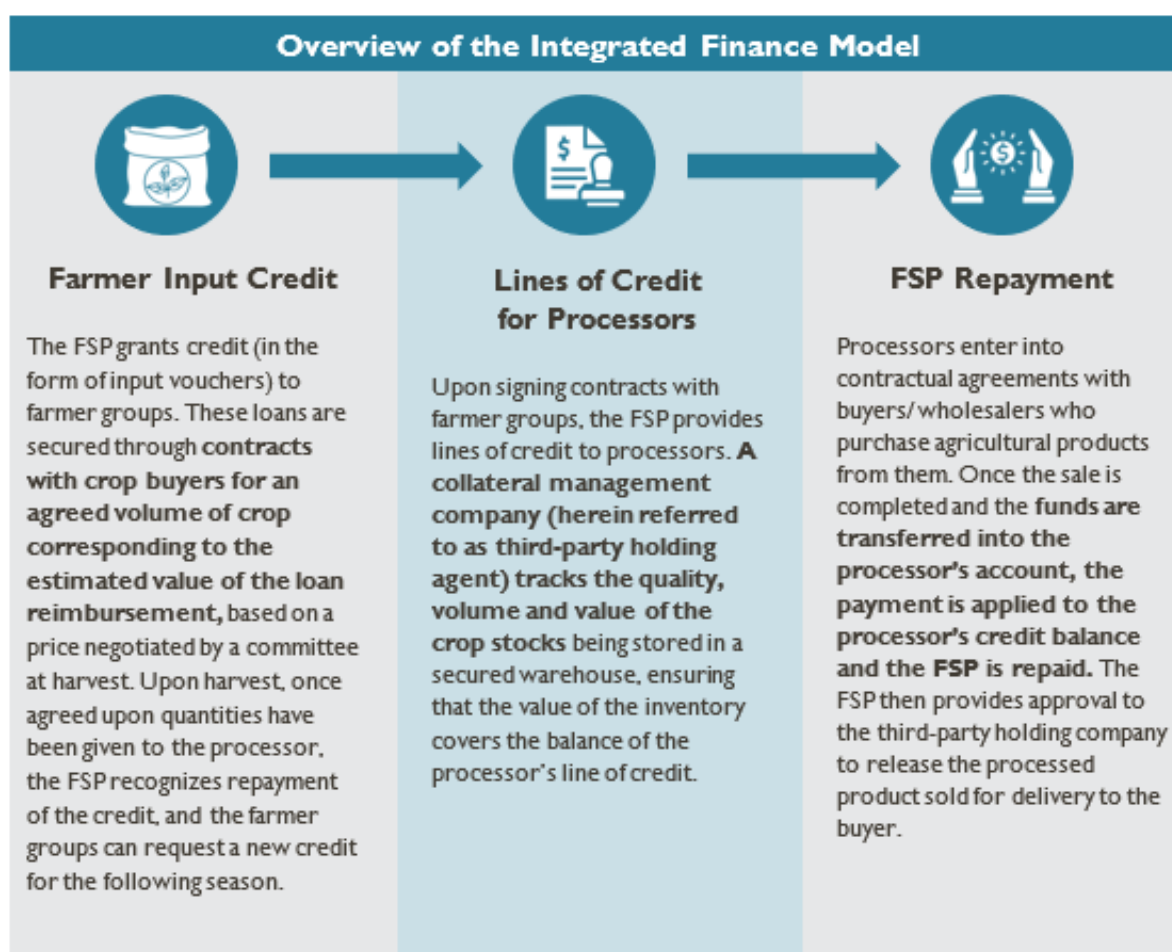
<sup>13</sup> Lambrecht, Isabel and Catherine Ragasa. [Do development projects crowd out private-sector activities? A survival analysis of contract farming participation in northern Ghana](#). IFPRI Discussion Paper I575. Washington, D.C.: International Food Policy Research Institute (IFPRI), 2016

formalized exchanges. This characterized the rice sector in Senegal prior to PCE, where transactions were largely done informally and via ad hoc spot markets.

Naatal Mbay introduced an alternative model, **the integrated finance model (IFM)**, in an attempt to de-risk transactions between buyers and sellers of rice. The IFM is a financial innovation that integrates elements of traditional contract farming models and a warehouse receipts system. It was heavily influenced by a model already being used in the port of Dakar by rice importers, collateral managers, and FSPs to finance large volumes of rice imports. At the time, local rice faced a critical disadvantage relative to imported rice in that buyers couldn't borrow against domestic rice stocks. This greatly limited the speed and scale of transactions in the rice distribution chain.

The IFM involves farmers and processors in open, FSP-supported contractual frameworks, and integrates credit mechanisms for both producers (seasonal credit) and processors (procurement/marketing credit). It places the FSP at the center of the system, tasked with facilitating the financing and payment of transactions between value chain actors.

Figure 3: Overview of Integrated Finance Model



# RESEARCH METHODOLOGY

## Research Questions

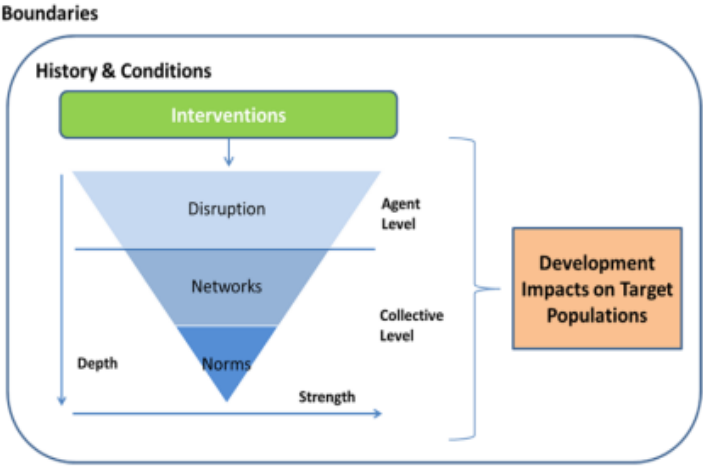
The ex-post study sought to answer the following core research questions:

- 1. What systemic changes was the initiative trying to create, to what extent had these changes been achieved when intervention activity stopped, and of those that had been achieved, have they been sustained?** Why or why not? At what scale? Is there evidence of other positive or negative systemic changes arising from the initiative that were not originally intended?
- 2. Has the performance of the system’s focus functions been maintained, deteriorated or improved relative to the status at activity closure?** Why or why not? What external factors impeded or contributed to the performance of the focus functions? Has performance of the system’s focus functions been able to effectively adapt and/or to absorb shocks and stresses (and if so, how)?
- 3. Have there been sustained and scalable gains to the ultimate intended target population as a result of the systemic change(s)?** Why or why not? What external factors impeded or contributed to these sustained gains? At what scale? Have sustained improvements accrued to women, poor (typically with small landholdings or small and growing businesses), the geographically remote and marginalized groups? Why or why not? If not, what have been the primary constraints to greater equity of participation and benefit? How did this vary over time?
- 4. Are there lessons about approaches to implementation that can be learned from the sustainability of outcomes (and the reasons for sustainability occurring/not occurring)?**

## Research Framework

The researchers applied the Disrupting System Dynamics (DSD) Framework<sup>14</sup> as the primary analytical framework to examine the extent to which systemic changes – observed via disruptions, network changes, and norm changes – had **strengthened** (i.e., have been characterized by increased prevalence and diversity within the system) and/or been **sustained** (i.e., whether the systemic change is still in place). This framework was selected given its usefulness in validating if the initiative

Figure 4: Disrupting System Dynamics (DSD) Framework



<sup>14</sup> MarketShare Associates. [Disrupting System Dynamics: A Framework for Understanding Systemic Changes](#). Washington: USAID Leveraging Economic Opportunities (LEO), 2016



made progress to delivering systemic change, and the extent to which any successful change has been sustained and scaled by the time of the ex-post study.

This study used the DSD’s definition of a systemic change as “*the diversion of a system down a new evolutionary path*” that can be observed via **disruptions, network changes, and norms changes**. Disruptions can include the incorporation of new business models, technologies, etc. Network changes can include shifts in the connectivity and flows in the system such as roles and relationships. Norms changes imply changes in behavioral expectations among market actors. The DSD framework was selected given its attention to spotting possible changes in network and norms, its articulation of specific signs to look for of each type of systemic change, its focus on relevant historical influencers and non-program-related factors, and its attention to the impact of systemic changes on target populations, and the extent to which any successful change has been sustained and scaled by the time of the ex-post study.

## **Research Approach**

The research approach was selected via the development of a research framework that was reviewed by a series of external experts and members of a technical advisory committee. A wide range of research tools and methods were used for three main purposes: i) to **validate** pre-existing assumptions and program-collected data; ii) to **measure** the extent to which changes occurred since program close; and iii) **explore** how, why, and where systemic changes have developed. Specific questions and research methods were selected to address each one of these aims. This included a review of program documents, other publicly available reports, program M&E data, primary business data provided by market actors, interviews with market actors and stakeholders and focus group discussions with target populations.

In total, 122 key informant interviews with market actors and stakeholders and 26 focus group discussions with rice producers were conducted. While the majority of key informants, including industry experts, representatives from FSPs, processors and leadership of farmer cooperatives that participated in the research were men, a series of FGDs and interviews with female-only cooperatives also took place. Approximately 26% of FGD participants were women. Annex I provides a breakdown of these figures. For this, purposive and snowball sampling approaches were used. This study also employed a desk review, phone calls with program staff, travel to the north and central region in Senegal, and a validation workshop with representatives from USAID Washington, USAID Senegal, other USAID-funded activities in Senegal, the technical advisory committee, and the national agricultural bank.



*Key informant interview with Adja Ndeye Gaye, President of the Female Producers of Ross Bethio.  
Photo Credit: Laura Courbois / MarketShare Associates*

To analyze the findings, the researchers identified and assessed multiple causal explanations using evidence collected through the research process, theoretical inference and critical observation. This process involved considering whether the relevant causal relationships outlined in the activity's Theory of Change were correct, what additional social and contextual factors were at play (including a review of significant private and public investments and interventions made in the focus sector between the end of the activity and the present), and how they contributed to the observed results. Causal explanations not supported by the evidence collected were dropped to ultimately reach a reasoned understanding of plausible contributions. The value of this type of ex-post hypothesizing and interpretation is in helping to make sense of the “surprises, contingencies and dynamic changes that characterize most value chains” by detecting observable mechanisms.<sup>15</sup> To combat the risk of confirmation bias, the research team identified possible outcomes ex-ante that they might find, outlined alternative explanations for the emergence of those outcomes, and developed questions to determine which of the explanations was more plausible.

### *Supportive and limiting factors*

Several supportive factors contributed to this ex-post study. The most salient ones include:

- **Availability of former PCE and Naatal Mbay staff.** Many former staff are either working on Dooleel Mbay or have remained actively involved in the rice system. This aided the evaluation's ability to access information and interviewees' familiarity with the program and its aims.
- **Limited contamination.** There were no large-scale development initiatives focused on commercialization and access to credit for market actors in the rice sector that were active between the closing of Naatal Mbay and the ex-post study. The most relevant initiatives were the World Bank and other donors' efforts – including particularly via the AgResults program – to introduce the warehouse receipt system. Those initiatives built on the infrastructure that Naatal Mbay supported to be put in place and enhanced the performance of the finance focus function for target farmers but have not affected the rice sector.

Since the closure of Naatal Mbay, there have been ongoing efforts by the GoS and other development actors to improve rice productivity and rice processing. This includes initiatives like PAPRIZ3, the third phase of a large program funded by the Japan International Cooperation Agency (JICA) which began in 2010. The follow-on USAID-funded Dooleel Mbay program was only conducting its in-field launch meeting at the time of the fieldwork. In March 2023, after fieldwork for this ex-post evaluation was concluded, the IFC announced a USD 7.2 million partnership with agCelerant and Bank of Africa to support lending to smallholder rice farmers and small rice producing businesses.

There were also various limiting factors that constrained the study, including:

- **Difficulty accessing and interpreting data.** The existence of large-scale entities such as the Agricultural Bank (LBA) and the National Bank for Economic Development (BNDE) possessing

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<sup>15</sup> Ton, Giel, Sietze Vellema, and Marieke De Ruyter de Wildt. [Development Impacts of Value Chain Interventions: How to Collect Credible Evidence and Draw Valid Conclusions in Impact Evaluation?](#) *Journal on Chain and Network Science*. 11(1): 69-84. 2011

substantial internal data on the performance of the IFM ultimately enabled the research to present results at a national level. Nevertheless, it proved very difficult to collect and reconcile it. Raw data frequently had not been synthesized or differed depending on whom within the institution was sharing it, making it challenging to know what data should be considered correct. The data obtained for the 2015-2019 period sometimes conflicted with that presented by Naatal Mbay, challenging the creation of datasets including both the implementation and post-implementation periods. To ensure comparability before, during, and after Naatal Mbay, data provided directly by the FSPs was used as the primary source of data. Many processors were unwilling to share information about their direct lending to farmers, meaning the amount of financing occurring via that channel could not be estimated. Finally, the inherent volatility of agricultural commodity markets means that the indicators of focus for this ex-post study were subject to changes unrelated to the IFM. These included spikes in input prices, major drops in international prices of one of the new value chains in which the IFM was applied (which reduces demand for credit), and weather-related production challenges. With just three years of data following program closure, such issues can make interpreting the evolution of the results of interest challenging.

- **Complication of the integrated finance model.** The model is complicated, and its success relies on many things working in parallel. Accordingly, studying a portion of it risks not understanding an important aspect influencing its performance. However, time and resources would not allow looking comprehensively at all aspects of the Naatal Mbay program. Key aspects linked to the IFM that fell outside the scope of this study include the upstream connection of the IFM to an improved seed system, the introduction of an equipment leasing model, and the bundling of crop insurance with producer loans.
- **Obtaining data from and about target populations was difficult and the quality was low.** Given the time that had passed since the closure of Naatal Mbay, the leaders and members of farmer groups sometimes did not prioritize making time to participate in interviews. Most data collected by FSPs and processors only counted the number of farmer organizations that were lent to and not the number of members within those groups, making it impossible to know the precise numbers of farmers receiving financing. Additionally, the team could not use endline data/impact assessment data as the ‘baseline’ for this study as sampling lists only disaggregated farmers by value chain and not by source of input financing (i.e., participation in IFM).

## KEY FINDINGS

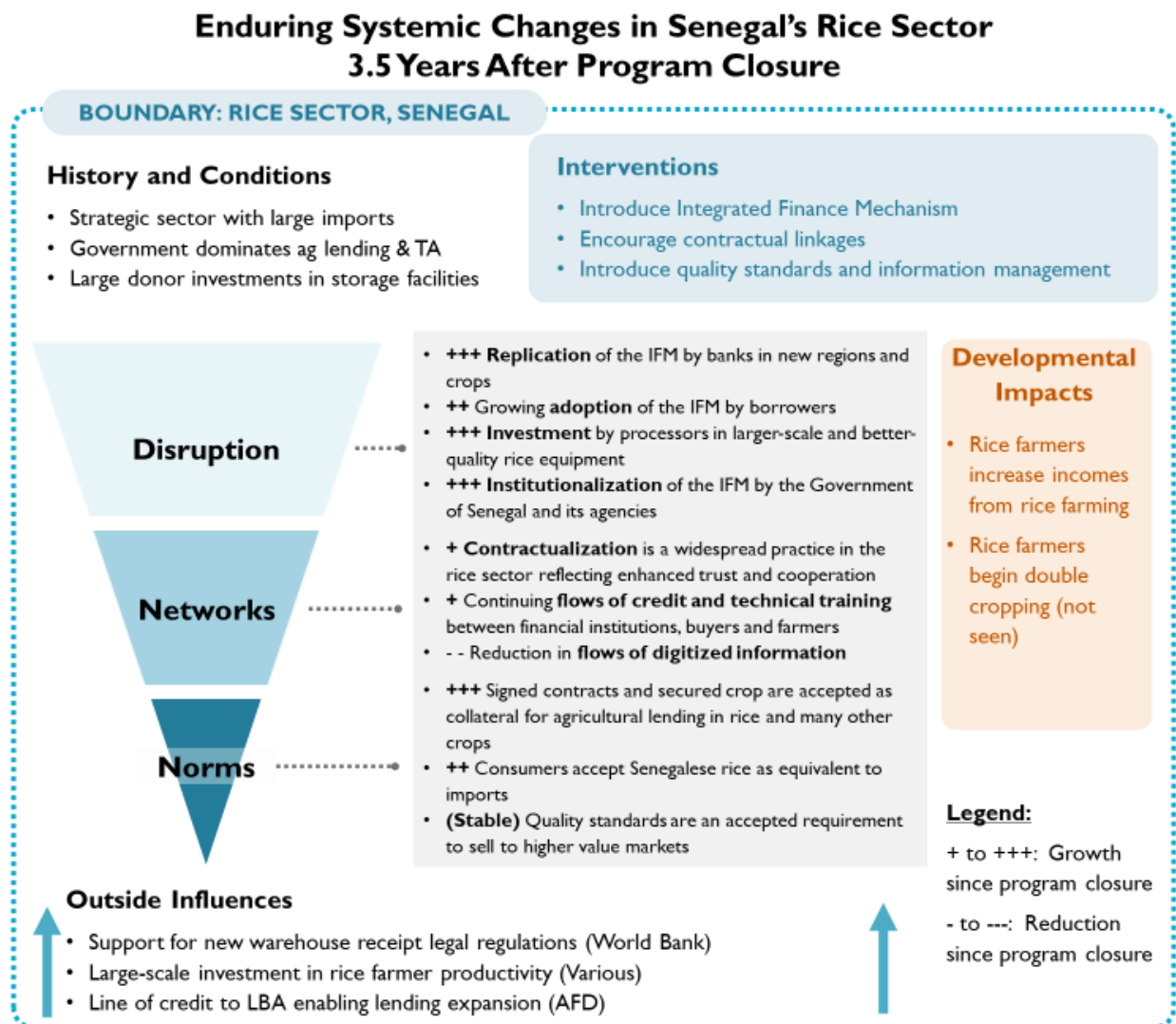
This ex-post evaluation gathered evidence on the current status of systemic changes that were understood to have occurred by program closure in 2019 and had been influenced by the IFM. The findings indicate that **three systemic changes** had endured at the time of the field research, while one did not, as noted by the “X” below.

- ✓ **Market actors accept signed contracts and secured crop as collateral on which to provide increased amounts of credit at reduced risk.**

- ✓ Contracting between producers and processors continues to be a widespread practice in the rice sector.
- ✓ Senegalese rice effectively competes in higher value local markets.
- ✗ The enhancement and digitalization of information management systems among unions of farmer cooperatives has not been sustained.

Each of the first three systemic changes are described in detail below. The fourth was not found and so is not discussed in depth. To avoid redundancy, the performance of the focus functions introduced in the executive summary is woven into each section. The following figure summarizes the systemic changes examined by the study.

Figure 5: Disrupting System Dynamics Framework: Naatal Mbay Systemic Changes



# Sustainability and Scale of Systemic Changes

## Systemic Change Area #1: Signed contracts and secured inventory are accepted collateral for agricultural lending.

### Situation prior to Naatal Mbay



Prior to Naatal Mbay, limited access to finance for value chain actors severely curtailed the rice sector’s growth.

Despite the presence of a dynamic banking sector, access to credit was one of the biggest impediments to rice production in the Senegal River Valley. The lack of transparency in the informal sector, coupled with climate variability, the absence of loan guarantees and a history of loan defaults in the SRV affected producers’ ability to access seasonal credit. Consequently, a vicious cycle ensued whereby farmers had insufficient incomes to invest in rice production and purchase quality agricultural inputs, resulting in lower yields which prevented them from turning a profit and re-investing in production the following season. The GoS would periodically forgive farmers’ outstanding agricultural loans, which also reduced willingness to lend and repay.

Similarly, rice processors, albeit few active prior to Naatal Mbay, struggled to access commercial credit to purchase paddy rice as their borrowing capacity was limited by the value of equity guarantees they could offer. This affected their ability to source sufficient quantities of product to meet processing needs and invest in equipment and expanding facilities, thereby reducing their presence in the market and their ability to compete with imports.

### Naatal Mbay intervention



Naatal Mbay worked with several partners to introduce a financial innovation that de-risked transactions between market actors, while increasing the availability of financing for both farmers and rice millers.

To remedy this, Naatal Mbay worked with market actors to broker an alternative model – the integrated finance model (IFM) described in Figure 3- with FSPs acting as ‘trade facilitators.’ This allowed producer networks to use stored paddy rice as collateral to receive credit. Many of Naatal Mbay’s key activities enabled the integrated finance model to function. This included the introduction of more rigorous quality control procedures, better stock management, the use of group contracts, price stabilization, and better data management practices to inform decision-making.

In order to increase access to financing for processors while also guaranteeing a satisfactory repayment rate for FSPs, Naatal Mbay supported the introduction of the third-party holding system. More specifically, Naatal Mbay directly paid for the costs of two third-party holding agents to begin operations

in the SRV and monitor paddy stored in warehouses on a sliding scale, starting with a 100% subsidy in 2016, 80% in 2017 and finally 60% in the final year of the program in 2018.

### Situation by the time Naatal Mbay ended



By project closure, the integrated finance model had become prominent and had expanded in the irrigated rice value chain in the SRV.

**Early signs of market actor-level imitation and investment level provided strong indications that the innovation was expanding.** Although LBA was the only bank that exclusively provided financing to both producers and processors through the integrated finance model, other financial service providers (FSPs) adopted elements of the model, namely the third-party holding system to secure commercial credit granted to processors. During Naatal Mbay, BNDE and Locafrique entered the market and started lending to processors to purchase paddy rice using the third-party holding system. In parallel, the International Finance Corporation supported the Government of Senegal to create a special legal status for grain receipts. This was critical for enabling financial institutions to engage in collateralized lending.

Another area where imitation had taken place during Naatal Mbay was amongst processors who used the integrated finance model to access commercial loans and purchase paddy rice. While the model was initially piloted with a few processors, by the time Naatal Mbay ended in 2019, there were 16 rice processors accessing commercial lines of credit (13 via the LBA and three via BNDE). Similarly, as the integrated finance model scaled, the number of farmer groups that accessed seasonal credit through the model increased progressively and reached approximately 500 farmer groups (with an average size of 40-50 producers) during the primary season, the *contre-saison chaude* (CSC) (i.e., the hot dry season) 2019.

By 2019, the irrigated rice value chain had experienced exponential growth in credit provided to market actors, due to significant investments by FSPs. The total value of seasonal credit provided to farmer groups through the IFM was USD 9.3 million during the CSC 2019, amounting to 15,435 Ha financed. Similarly, the value of commercial credit provided to processors in 2019 amounted to USD 13.8 million.

As Naatal Mbay came to a close, **an important normative shift had occurred among three FSPs in Senegal that recognized paddy rice as collateral for lending.** This was evidenced by the rising volume of credit awarded to farmer groups by 2019. It reflected a reduction in the risk faced by the FSPs (demonstrated by rising reimbursement rates) as they began to see borrowers' inventory as a viable asset to lend against. Similarly, lending to farmers using their contracts with rice processors as security represented a normative shift away from requiring that farmers use their own assets as collateral. These changes were transformative for how the rice market system operated. They enabled corresponding changes in how networks function, encouraging more trusting relationships and reinforcing the move towards contracting.

### 3.5 years later: Sustainability and scale of systemic change

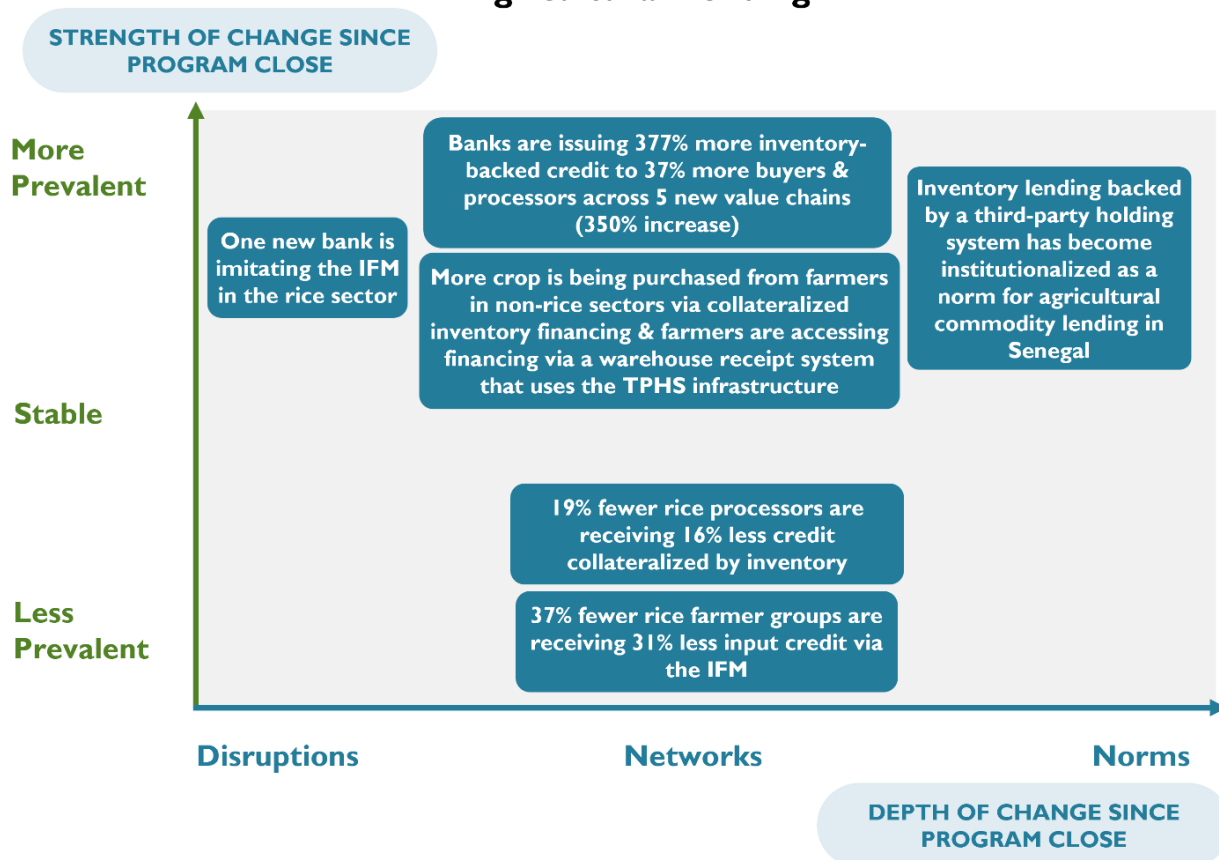


Since Naatal Mbay ended, the number of rice processors accessing commercial lines of credit has reduced from 16 in 2019 to 13 in 2022 and the overall value of commercial credit to rice processors has decreased by 12%. Similarly, the number of rice-growing farmer groups accessing production credit through the IFM decreased from 672 in 2019 to 426 in 2022, with the overall value of input credit to farmers decreasing by 31%. However, the provision of commercial credit to buyers and processors, backed by the third-party holding system, has spread to other five value chains. Hence, across the entire agricultural sector, 37% more companies are accessing 377% more inventory-backed lending than at the close of Naatal Mbay. Approximately USD 5.5 million in credit was also issued via a warehouse receipt system that used the TPHS infrastructure.

The following figure summarizes how aspects of this systemic change evolved between the end of Naatal Mbay and the ex-post evaluation. Each one is described in more detail below.

Figure 6: Evolution of systemic change: Accepted Collateral for Agricultural Lending

### Signed Contracts and Secured Inventory are Accepted Collateral for Agricultural Lending



***The number of FSPs offering inventory lending to buyers remains stable with some imitation in IFM lending to farmers.***

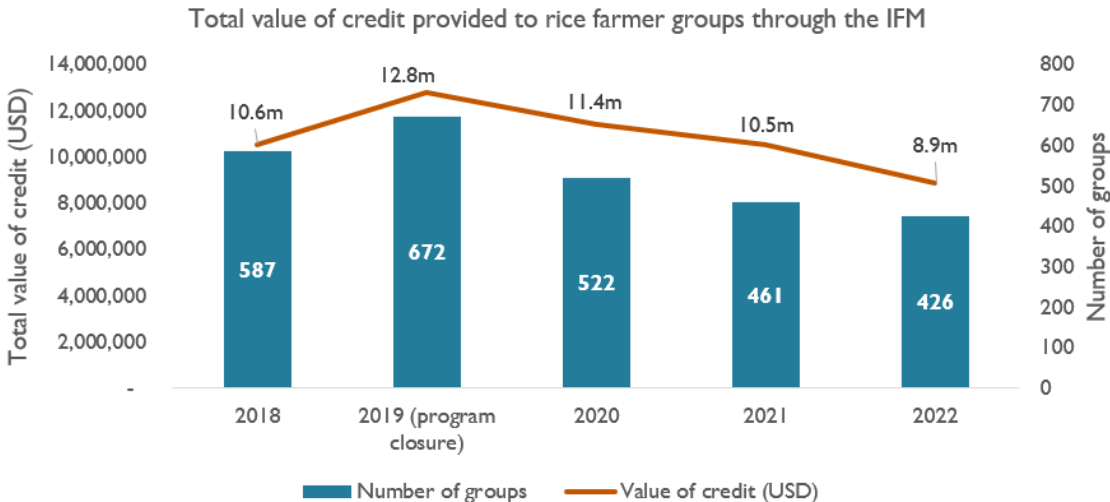
LBA and BNDE continue to provide commercial loans to processors and buyers backed by crop collateral. Locafrique has continued to lend to large processors but no longer uses paddy as collateral. The research did not find evidence of other FSPs lending backed by the third-party holding model.

In terms of using the IFM to lend to farmers, the ex-post evaluation found some evidence of **imitation** over the last three and a half years. Although LBA has remained the only FSP providing input financing to farmers through the IFM, Crédit Mutuel du Senegal (CMS) has been applying aspects of the IFM as a pilot over the last few years in the SRV and in early 2023 sought approval from its leadership to formally roll it out. There is limited additional potential for imitation in Senegal given that LBA is the primary lender for agricultural production and is able to offer subsidized interest rates that its competitors cannot.

***External factors have negatively impacted the provision of credit to farmers and processors through the IFM in the rice sector.***

In the rice sector, the provision of credit to both farmers and processors through the IFM has fluctuated since the end of Naatal Mbay. As illustrated in the graph below, the value of credit granted to rice farmers declined in 2020 through to 2022, as did the number of farmer groups that accessed credit through the IFM. This reduction in credit granted to farmers was a direct consequence of poor productivity driven by climatic and other COVID-19 related shocks in recent years. Reduced yields affected farmers’ ability to repay their loans to the banks, thus impacting their creditworthiness and ability to access credit in the next season.

Figure 7: Total value of credit provided to producer groups through IFM



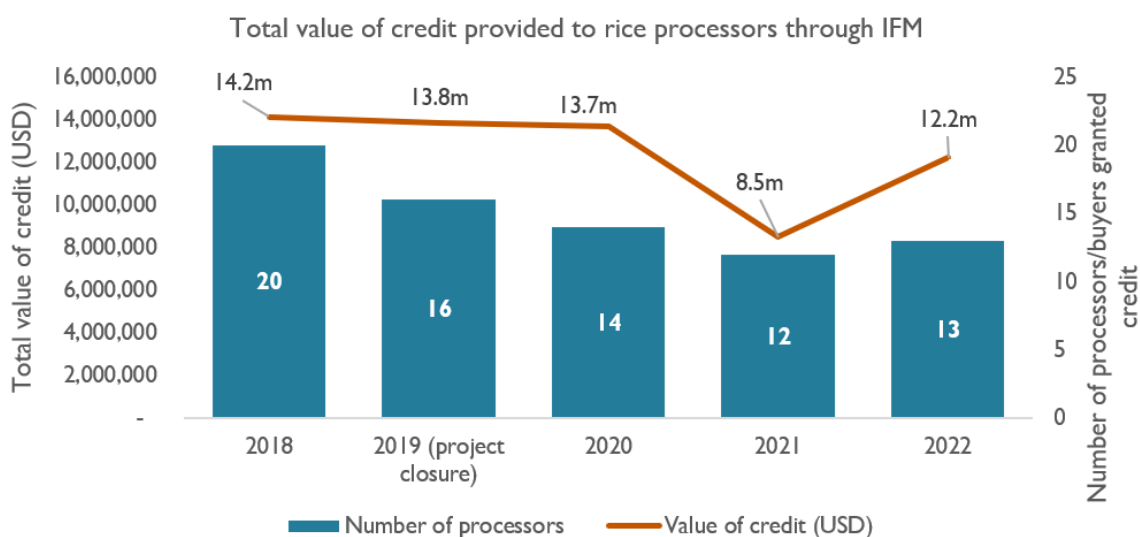
Similar trends can be observed for the provision of commercial credit to rice processors. As depicted in the graph below, the total value of credit and the number of processors granted credit decreased in 2020 and 2021 but rose again in 2022. This is not surprising given that there is a direct correlation



between the availability of paddy rice and the financing needs of processors. As less credit is granted to farmers, the volume of paddy that processors can access through the IFM circuit decreases, and in turn so does the amount of credit they need. Despite the reduced performance of the IFM between 2019-2021, farmers and processors are hopeful that as productivity stabilizes, so will the provision of credit through the IFM.

*“In 2020/21, we faced various challenges that reduced our productivity. As a result, many farmers in the SRV could not pay back their loans with the bank. In the future, we hope to regain the bank’s trust by paying off outstanding debt and start participating in the IFM again.” – Farmer group in Dagana*

Figure 8: Credit provided to rice processors through IFM



Despite a slight reduction in the overall number of rice processors accessing commercial credit through the IFM, signs of **imitation** have emerged over the last three and a half years, with six new rice processors starting to use the model since program closure. The adoption of this innovation following program closure signals that the systemic change continues to endure at the agent level.

Additionally, the strength of the systemic change is also observed through actors continuing to use the model or returning to use the model over time. A separate set of six processors have continued to access lines of credit from the LBA on an annual basis since the program closed in 2019. A few processors decided to stop using lines of credit from the LBA and either turned to self-financing or other financing options over one or several campaigns. They later reapplied for lines of credit with the bank via the IFM in subsequent years, noting they had inadequate internal capital to lend to a similar number of rice farmers as they could do using IFM financing and were unable to source sufficient quantities of paddy rice outside of the IFM circuit. This speaks to the **resilience of the model** as an attractive source of financing for market actors. From the FSP’s perspective, inventory lending continues to help reduce the risks associated with lending in the volatile agricultural sector. For example, BNDE noted that instead of dropping one borrower that was struggling to repay, they instead began requiring

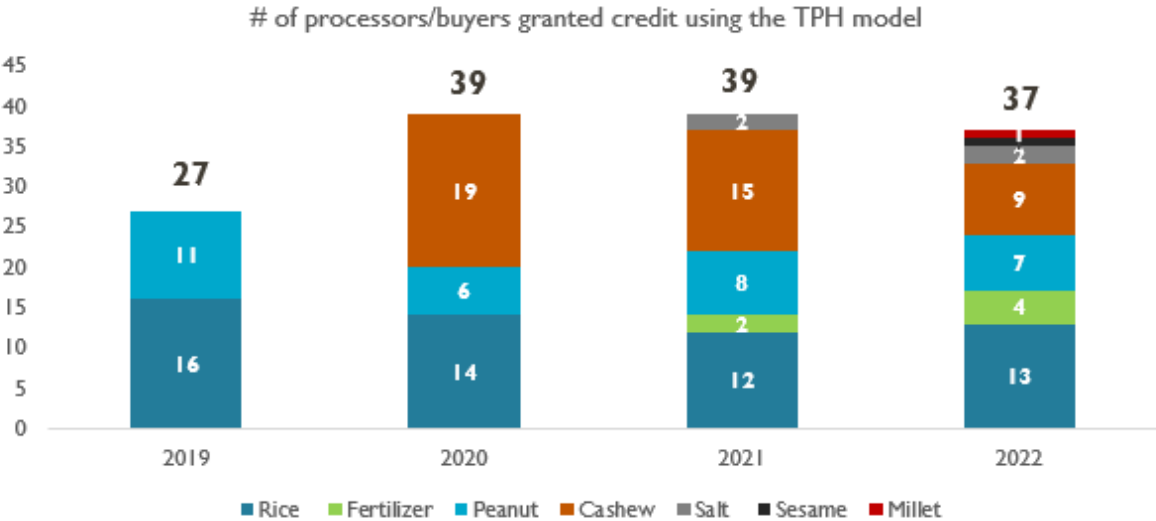
that lending was collateralized by their inventory. This allowed them to maintain their lending relationship and increase the amount of capital allocated to the client.

***The IFM has spread beyond rice to other key agricultural crops.***

Despite a decrease in the provision of commercial credit to rice processors, there has been a considerable increase in financing granted to processors/buyers across the wider agricultural sector. This stems from the expansion and adoption of the third-party holding model across other value chains and geographies. The IFM model has been adapted and scaled internally by the LBA and BNDE, the two largest agricultural lending institutions in Senegal, since program closure. Both institutions have expanded the model to new areas and crops. The number of value chains in which agricultural lending is being collateralized using crops as assets has increased from two (i.e., rice and peanut) to seven (i.e., rice, peanut, cashew, sesame, millet, fertilizer, and salt). Additionally, it is now being applied in all three agricultural zones of Senegal as opposed to one in 2019. This **replication** of the model in other parts of these institutions’ operations is an indication of the growing strength of the systemic change.

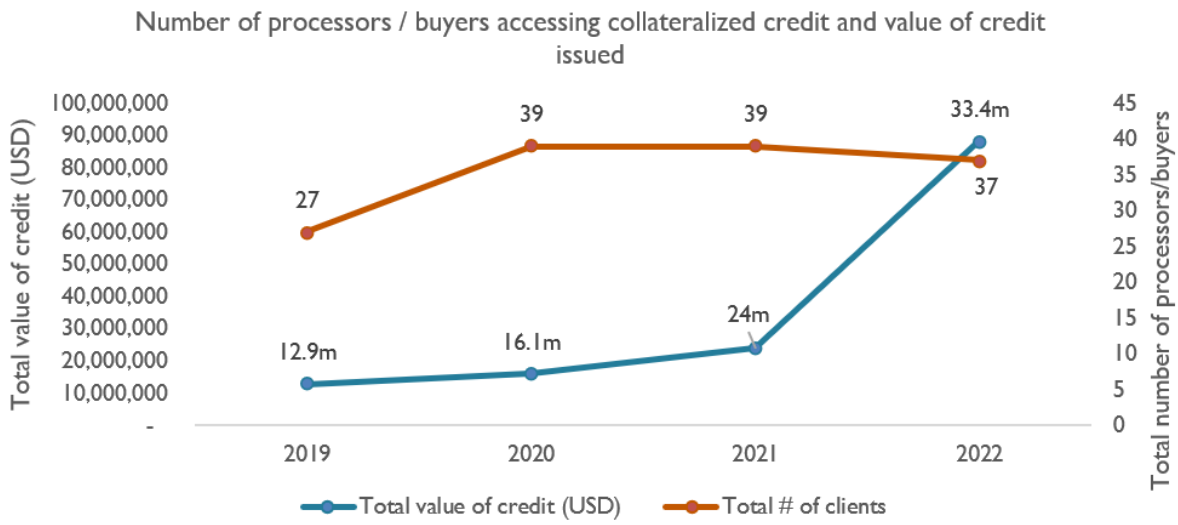
The overall number of processors and buyers in the agricultural sector in Senegal accessing credit using the third-party holding system increased from 27 in 2019 to 37 in 2022, an increase of 37%.

Figure 9: # of processors/buyers granted credit using the TPH model



Similarly, the total value of credit backed by agricultural collateral issued to processors and buyers increased from USD 12.9 million in 2019 to 88.4 million in 2022, representing a 377% increase. This was largely driven by a significant increase in credit provided in 2022 in the fertilizer value chain and the peanut value chain, as well as the introduction of collateralized lending in the sesame and millet value chains in that year.

Figure 10: Value of credit granted using the TPHS + # of processors/buyers



***The third-party holding system has become institutionalized as a requirement for agricultural commodity lending.***

The third-party holding system has become embedded in the provision of commercial financing, with financial service providers making it a requirement for marketing credit. Processors have agreed to absorb that cost in order to continue access financing. This suggests that there is a strong sense of buy-in among key market actors, thereby underscoring the strength of systemic change. In addition, since program closure, the Government of Senegal has also supported the **institutionalization** of the third-party holding system, at the processor level. This is evidenced by the GoS' introduction in 2022 of a 2 CFA Franc subsidy per kilo of rice for processors to cover the cost of the third-party holding system. This was in addition to a separate subsidy per kilo of rice produced in Senegal announced by the GoS in the same year that is described below.

The institutionalization of the third-party holding system is well demonstrated by its integration into a complementary model to the IFM introduced following the closure of Naatal Mbay. This model, described as a warehouse receipt system, enables farmers to borrow up to 80% of the value of their crop if deposited at a warehouse overseen by a third-party holding agent. This model is being implemented in parallel to the IFM by the LBA. In its first full year of operation in 2022, this system financed USD 5.5 million in loans to farmer groups collateralized by 10,500 tons of stored cashew and peanuts (with substantial support from the donor funded AgResults program). This system has not been applied to the rice value chain as the fixed selling price for Senegalese rice via the formal channels means there is little financial incentive for farmers to delay sale of their crop to await higher prices. There have been many entities that have supported and influenced the development of this new system, including the World Bank and a number of other donor-funded initiatives. For instance, the World Bank and IFC supported the development of the Senegalese regulatory framework for warehouse receipt systems. Naatal Mbay's principal contribution is that the new system uses the third-party holding system that it

supported. The fact that government subsidies and the new warehouse receipt system are both built on the third-party holding system suggests that collateralization has become an enduring norm for how agricultural lending now operates in Senegal – a sign of a sticky systemic change.

## Systemic Change #2: Contracting between producers and processors becomes a widespread practice in the rice sector

### Situation prior to Naatal Mbay



Prior to PCE and Naatal Mbay, the lack of a coordinated market system remained one of the perennial challenges constraining Senegal's agricultural growth, particularly in the rice sector. Rice marketing was highly informal, characterized by the absence of marketing and formal production contracts.

Up until 2010, the rice value chain in the SRV was highly fragmented and informal, characterized by a high degree of uncertainty, informality, and risk, as well as a lack of production planning. Most farmers were not commercially oriented and preferred to sell their paddy in small quantities and intermittently in order to minimize household risks and smooth consumption. Some larger producers were producing paddy for commercial purposes, but transactions were typically done informally, without contracts or integrated services.

Local rice marketing and processing was largely informal. Farmers used small local millers to process their rice for their own consumption and local selling. These small-scale millers did not have the facilities to adequately clean, sort, and polish rice. As a result, rice from the SRV was of lower quality than imports, often filled with stones and impurities. Small-scale local milling accounted for 80 percent of SRV's processing, largely due to the absence of modern processing facilities equipped to meet urban quality expectations. Inconsistent supply, poor quality paddy, aggregation inefficiencies, and poor credit access negatively impacted processors' ability to source sufficient volumes of paddy rice to operate profitably. This disincentivized existing processors and potential new entrants from investing in modernized processing capacity. As a result, rice from the SRV could not compete with important rice in urban markets. The more structured and embedded imported rice distribution channels covered the urban consumer market.

### Naatal Mbay intervention



Naatal Mbay employed a market-led approach that built incentives for behavior change among market actors and leveraged multi-party arrangements to establish formal contractual arrangements between producers and processors.

PCE and Naatal Mbay supported the introduction of a contractual framework for rice marketing. Naatal Mbay helped deepen market linkages in the rice value chain through workshops and technical assistance

targeting both supply- and demand-side forces, including strengthening the adoption of quality control standards, defining and negotiating prices, improving the efficiency of marketing, introducing data management systems, and integrating access to finance.

For contracting to work within the rice sector, Naatal Mbay, in partnership with other actors and partners, focused its efforts on the following: 1) encouraging and financing the participation of key stakeholders in the annual price setting meetings; 2) supporting the adoption of data management systems via network-managed databases and the development of cloud-based systems for stock management; and 3) building the capacity of producer networks to autonomously manage grouped marketing arrangements.

### Situation by the time Naatal Mbay ended



By 2019, contracting between farmer groups and processors had become a widespread practice in the rice sector and had contributed to the emergence of a new generation of rice millers operating in the Senegal Rice Valley.

**By 2019, approximately 60% of total paddy rice produced was sold under contract** according to the National Society for the Development and Use of the Lands of the Senegal River Delta (known as SAED in French), an extension service agency affiliated with the GoS based in the SRV. This reflects a network change, and hence a stickier type of change, because the way that market actors interact with each other shapes many aspects of the system. Market systems characterized by spot markets tend to be focused on short-term profit maximization. In contrast, contracts are frequently a signal of trust and a willingness to invest in longer-term mutual benefits. Based on interviews with market actors, at the time the program ended, there were also **early indications that the formalization of relationships between market actors had resulted in greater trust and cooperation.** This was evidenced through increased investment by processors in agronomic support to producer groups they contracted. An additional sign of the strengthening relationships between processors and producer groups is that by the time the program ended, some producer groups were selling all of their rice to the processors with which they had a contract beyond that necessary to repay their loan.

Contracting through the IFM, and the associated increases in paddy supply, also contributed to the **emergence of a new generation of more than 60 industrial mills** of varying sizes and processing capacities operating in the Senegal River Valley. **This was a stark increase from just three fully operating in 2010 and this investment was a notable sign of systemic disruption, reflecting substantial confidence of investors in the future growth of the sector.** One way that contracting enabled large-scale rice processing investments was by increasing processors' confidence in being able to access rice to process at guaranteed prices. These signs of enhanced trust and greater interaction were a sign of deeper, more durable networks among market actors.

### 3.5 years later - Sustainability and scale of systemic change

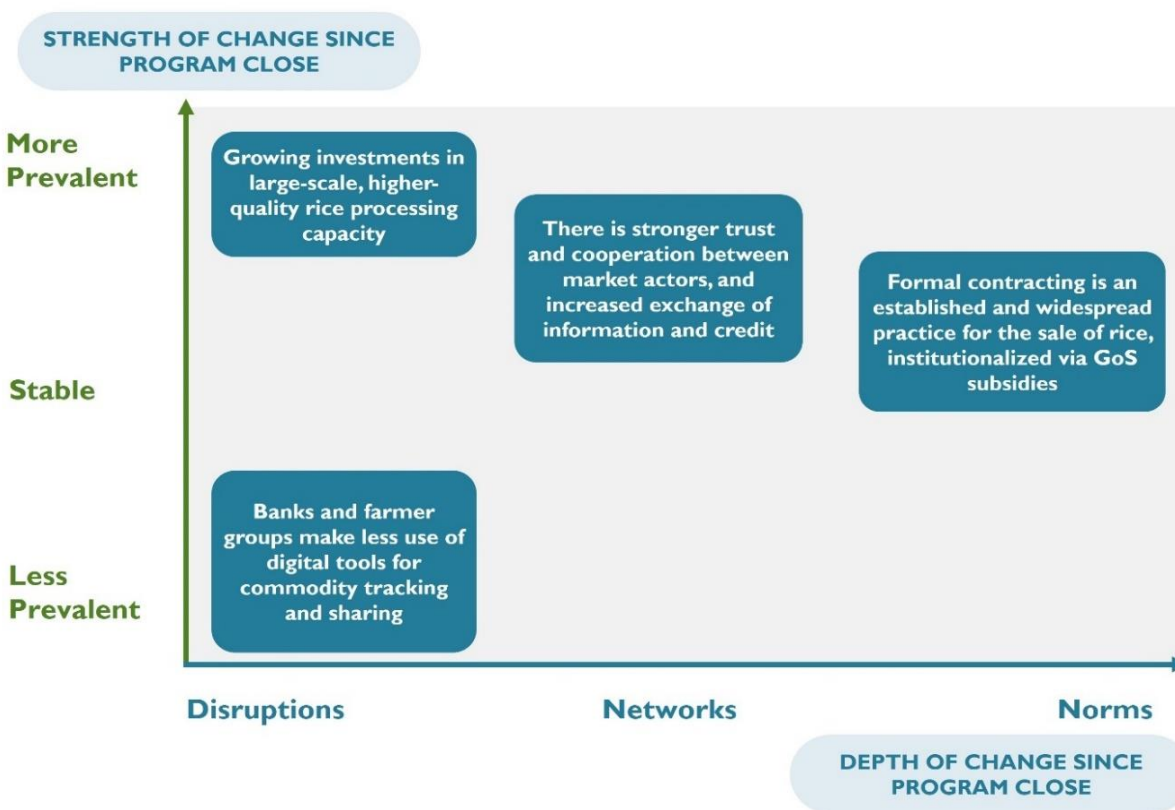


As of early 2023, investments into new rice processing plants and upgrading of existing plants continues to grow. Contracting within the sector has been institutionalized by the GoS as a requirement to access subsidies. Trust and cooperation have grown between market actors.

The following figure summarizes how aspects of this systemic change evolved between the end of Naatal Mbay and the ex-post evaluation. Each one is described in more detail below.

Figure 11: Evolution of Systemic Change: Contracting

### Contracting Between Producers and Processors Becomes a Widespread Practice in the Rice Sector



#### ***Rice marketing in the SRV remains more structured and formalized.***

The ex-post evaluation found that formal contracts remain the main channel through which paddy rice is marketed in the SRV. Over two thirds of processors interviewed indicated that they source the majority of their paddy supply through formal contracts. Half of the processors source paddy rice through the IFM, and two thirds also noted that they also source paddy through direct contracts with producers. Given the increasing demand for paddy rice in recent years, processors typically use a number of

sourcing channels to acquire sufficient volumes of paddy including their own production, paddy sold through the IFM, paddy acquired through direct contracts with producers, and at times from harvest service providers paid in-kind for their services.

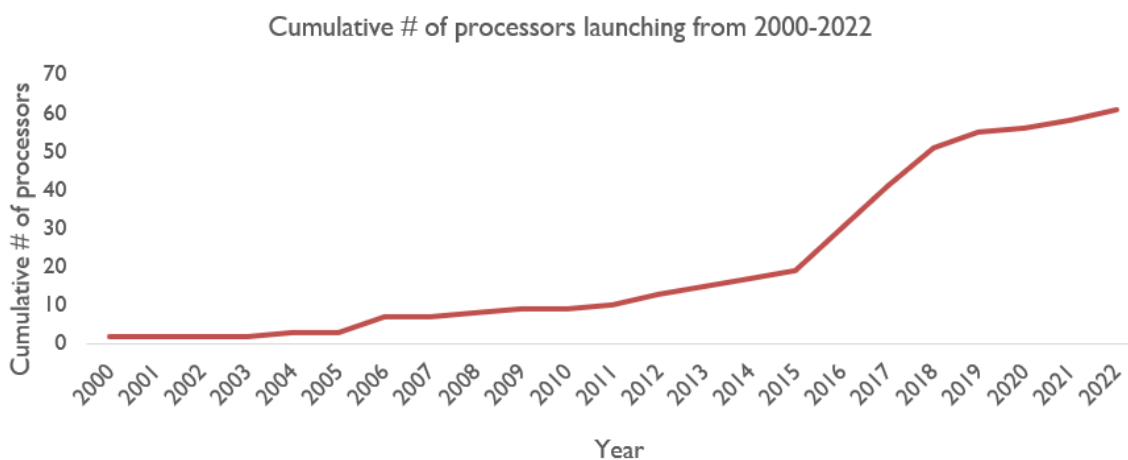
Although paddy rice marketing is now largely conducted through formal channels in the SRV, informal marketing still takes place. While the ex-post could not quantify or estimate volumes of paddy rice sold outside formal contracts, there is evidence that some producers sell informally to processors or traders. This is especially the case for farmer groups who owe money to the FSP or processors and thus are deemed too risky as commercial partners.

The strength of this change is also shown through signs of **institutionalization**. Recognizing the positive impact of contracting on the sector, and more specifically its contribution to the GoS' goal of rice self-sufficiency, the Government of Senegal's 2022 price subsidy<sup>16</sup> for rice farmers was only payable via processors that purchased paddy rice through formal contractual arrangements. This further signals that contracting is becoming increasingly embedded in the system.

***Contracting has contributed to substantial investment in rice processing.***

The rice sector experienced a rapid increase in the number of new processors beginning to operate during the lifetime of the program. New entrants have continued to establish themselves since 2019, albeit at a slower rate. The reduction in pace at which new processors have started operating in the SRV stems from excess processing capacity within the sector due to extremely high levels of competition for paddy rice. The graph depicts the cumulative number of processors that launched over time (not the number of active processors in a given year)

Figure 12: Cumulative # of processors launching from 2000-2022



<sup>16</sup> In 2022, the GoS announced a five-cent (30 CFA Franc) subsidy per kilo of rice produced payable to rice farmers via the processors who they sell to as well as a 2 CFA Franc subsidy per kilo of rice for processors to cover the cost of the third-party holding system.

**Note:** This graph is based on a sample of 61 processors willing to share company information. However, it is estimated that there are 70+ processors in the SRV.

While the sector has experienced an increase in the number of processors in the SRV, challenges in accessing adequate quantities of rice mean that not all are active and very few operate at full capacity. Some are operating at 50% capacity, while others are able to process rice for nine to ten months out of the year. High performing processors are those that continue to source paddy through the IFM or have long-standing and well-established relationships with producer networks. These tend to be processors that have been operating for many years, though some new entrants have also found success



Exterior of a rice processing plant in Senegal. Photo Credit: Laura Courbois / MarketShare Associates

Roughly one fifth of processors also temporarily or permanently suspended their business activities over the last few years, the majority of which reported doing so between 2018 and 2020. This was largely driven by their inability to access sufficient volumes of paddy rice as a result of a reduction in rice productivity. This was exacerbated by the adverse effects of various climatic shocks, followed by the COVID-19 pandemic.

Hence, the amount of investment in rice processing has actually exceeded the volume of domestically produced rice available for processing. Nevertheless, domestic rice processing is substantially higher than prior to Naatal Mbay. The system of contracting has maintained the confidence of many processors to continue operating. As one processor noted:

*“The IFM is a model that allows us to have access to paddy more easily and sold at a fixed price. There is no speculation, nor wastage. This system also provides us with the reassurance that we can access sufficient stocks of paddy to keep operating.” – Large-scale rice processor in the SRV*

The consolidation effect of the IFM model, which contributed to a reduction in transport and other sourcing costs, made rice processing more profitable and thus enabled processors to be more competitive. While improved paddy consolidation proved beneficial for the sector, the road infrastructure could not adequately support this growth, as the feeder roads were not designed for sustained large-scale haulage above 30 tons. Following the closure of Naatal Mbay, in order to ensure continuity of growth for the local rice sector, the African Development Bank approved an investment in a backbone network of paved roads within the delta dubbed "la Boucle du Riz" (the rice beltway). This is currently under procurement and is expected to significantly increase throughput<sup>17</sup>.

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<sup>17</sup> Technologies Propres. [Projet de Construction de la Route de la Boucle du Riz – Etude d’Impact Environnemental et Social](#), 2021



While PCE/Naatal Mbay played a catalytic role in generating growth in the processing sector, there were a number of actors, particularly JICA, that intervened to support this upgrading as well. This was mostly done through capital investment in milling equipment, coupled with capacity building and training which increased processing activities, and in turn improved the quality of white rice produced. The GoS further supported this by subsidizing the cost of capital investment for upgrading.

***The relationships between market actors are characterized by enhanced trust and cooperation.***

Direct contracting between producers and processors has gained traction since 2019, with processors deploying various strategies to establish and retain commercial relationships with efficient producer networks. This includes the provision of private sector-led extension services and other in-kind benefits – including input credit and other services such as mechanization, transport, etc. – to attract producer groups and thus secure sufficient paddy supply.

Although the exact number of processors providing input credit to contracted producer groups during the lifetime of Naatal Mbay is unclear, at the time of the ex-post evaluation, half of the processors that participated in the research indicated that they provide input credit to producers and accept to be paid in paddy. Greater levels of direct contracting between producers and processors suggests that the trust and cooperation among market actors has endured beyond the lifetime of the program. Processors' investment in the provision of services to producer groups reflects processors' trust that farmers will honor their contractual commitments to supply them with rice.

*“We now see good relationships between producers and processors. Whereas processors used to wait until harvesting time to start interacting with producers, nowadays, processors are constantly in contact with producers.” – Producer network in Ross Bethio*

Several structural factors likely contributed to strengthening trust and cooperation. First, the surplus of demand for rice to process over the availability of supply means that processors are more willing to invest in their relationships to secure supply. This is made more important by the scale of the investments that large-scale rice processors have made in their equipment, which implies significant losses if they cannot secure adequate paddy. Finally, the existence of fixed prices in the rice sector greatly reduces a common risk to both parties of making contractual sale commitments: that price fluctuations subsequent to contracting will be unfavorable to one of the two parties and reward side-selling. The IFM itself enhanced trust too, both via the security for both parties that the FSP purchase guarantee provides and the use and verification of rice quality standards that lets processors know they are likely to get good quality paddy.

***While market actors continue to make data-informed commercial decisions, most of them have adapted the way they do so.***

Despite significant investments by Naatal Mbay to support the development and adoption of data management systems across the value chain, the use of many of these systems does not appear to have been sustained beyond the lifetime of the program. Naatal Mbay worked with producer networks to introduce self-managed digital data systems specifically tailored to networks' management needs,

compatible with their technological context, and capacity and skills – ranging from excel databases to more sophisticated software that enabled producer networks to monitor and share climate information and for agronomic monitoring of plots of land. While the gradual roll out of contextually appropriate digital tools resulted in impressive uptake of data management systems during the lifetime of the program – with the number of databases managed by local networks increasing from 10 in 2012 to 123 in 2018 – this has not been sustained beyond the lifetime of the program.

While the research could not quantify the number of databases managed by local networks at the time of the ex-post, the majority of producer networks that participated in the research noted that they have reverted back to paper-based data collection with some continuing to use off-the-shelf database software but collecting far less data. None of the producer networks that participated in the research are continuing to use the software introduced during Naatal Mbay used for georeferencing, quality control, and rainfall tracking. Unanimously, producer networks noted that they struggle to self-finance the costs of digital tools introduced during Naatal Mbay. Despite this shift, nearly all producer networks continue to collect key information needed to inform decisions related to credit requests, input supply, and marketing.

*“Yes, we still use a smartphone and computer provided by Naatal Mbay, but we have adapted the way we collect data. We now only collect data on land area and production volumes. Everything else warrants financial resources that we do not have (e.g., paying data collectors and database managers which Naatal Mbay used to cover).” President of producer network*

A similar situation is observed with FSPs. Although Naatal Mbay supported the development of a cloud-based stock management system for LBA to more efficiently monitor paddy and white rice stocks under the IFM, LBA indicated that they are no longer using this system. Both LBA and producer networks indicated that the costs associated with continuing to use these digital data platforms presented an obstacle to sustained use.

### Systemic Change Area #3: Senegalese rice effectively competes in higher value local markets.

#### Situation prior to Naatal Mbay



Prior to Naatal Mbay, rice produced in the SRV was restricted to local consumption. The value chain supplied low quality rice, characterized by a heterogenous mix of whole and broken grains, high impurity content, and inconsistent humidity rates, all of which constrained local rice’s competitiveness and its ability to penetrate higher-end urban markets.

Historically, the urban population had a strong preference for imported rice which was cleaner, more appealing in appearance, and more homogenous compared to local rice which consumers deemed to be

inferior in quality. The biggest deterrent was the amount of impurities (such as stone and dirt) found in local rice. This was a result of both poor production and post-harvest practices at the farm level, inadequate processing facilities, and the lack of quality standards across the industry.

Prior to Naatal Mbay, most rice was processed in small local mills that were not equipped to produce high-quality rice that responded to urban consumers' preferences. This situation severely constrained the performance and competitiveness of the sector, and culminated in low prices for rice producers, sub-standard productivity at processing facilities, and marketing challenges across the value chain. A key contributing factor was the absence of a formal quality control system to govern commercial exchanges across the market.

### Naatal Mbay intervention



To improve quality across the value chain, Naatal Mbay supported both producer networks and processors to take charge of the development and application of a pragmatic and effective quality management framework.

In order to improve the quality of rice from the SRV, and in turn improve its competitiveness, Naatal Mbay facilitated the development and adoption of a quality management framework, embedded within business contracts between market actors. This entailed establishing quality standards and quality assurance protocols to be adhered to by all parties. In order to build the capacity of producer networks to better apply quality control practices, Naatal Mbay trained networks on farm gate norms and standards and adapted testing and traceability protocols. On the processing side, Naatal Mbay reinforced the capacity of processors to engage in better quality control and supported the upgrading of processing facilities in order to meet high-market quality requirements.

Once the quality of the SRV rice improved sufficiently to meet urban market standards, Naatal Mbay facilitated downstream market linkages between processors and wholesalers, and promoted local rice brands. Naatal Mbay supported processors to improve their branding and packaging, facilitated meetings with wholesalers, and sponsored the participation of rice market actors in agricultural fairs as a way to raise awareness among urban customers on the newfound quality of rice from the SRV.

### Situation by the time Naatal Mbay ended



By project closure, the adoption of quality standards had become widespread throughout the rice value chain in the SRV. As market actors upgraded and enhanced the quality of their products, a normative change occurred around the quality of domestic rice, resulting in a considerable increase in local rice consumption in urban areas.

As the IFM innovation helped strengthen the wider rice market system, it also bolstered the competitiveness of the Senegalese domestic rice sector versus the import market. As local rice began to

compete in those higher value markets, a virtuous cycle could start in which investments in quality were rewarded. By program closure, **a clear quality management system had been instituted across the rice sector, and quality standards had become an integral part of contractual frameworks between producers and processors.** It is estimated that – by the time the program ended – 80% of paddy rice produced by farmers responded to quality norms, further showing how deeply embedded these practices had become in the rice sector as a norm for how business is done.

By 2019, there had been a clear normative change within the consumer market about the quality of rice from the SRV, as demonstrated through a substantial increase in demand by urban consumers for local rice over the program period and the creation of brands for urban distribution. During the lifetime of Naatal Mbay, the number of Senegalese rice brands that could compete with imports in terms of quality rose substantially to 50 in 2018. One result of this is that Senegal was one of only three West African rice producing countries (out of 15) that reduced the proportion of rice they imported between 2009 and 2019.<sup>18</sup> This was despite a fast-growing population and steadily increasing per capita consumption of rice.

### 3.5 years later - Sustainability and scale of systemic change



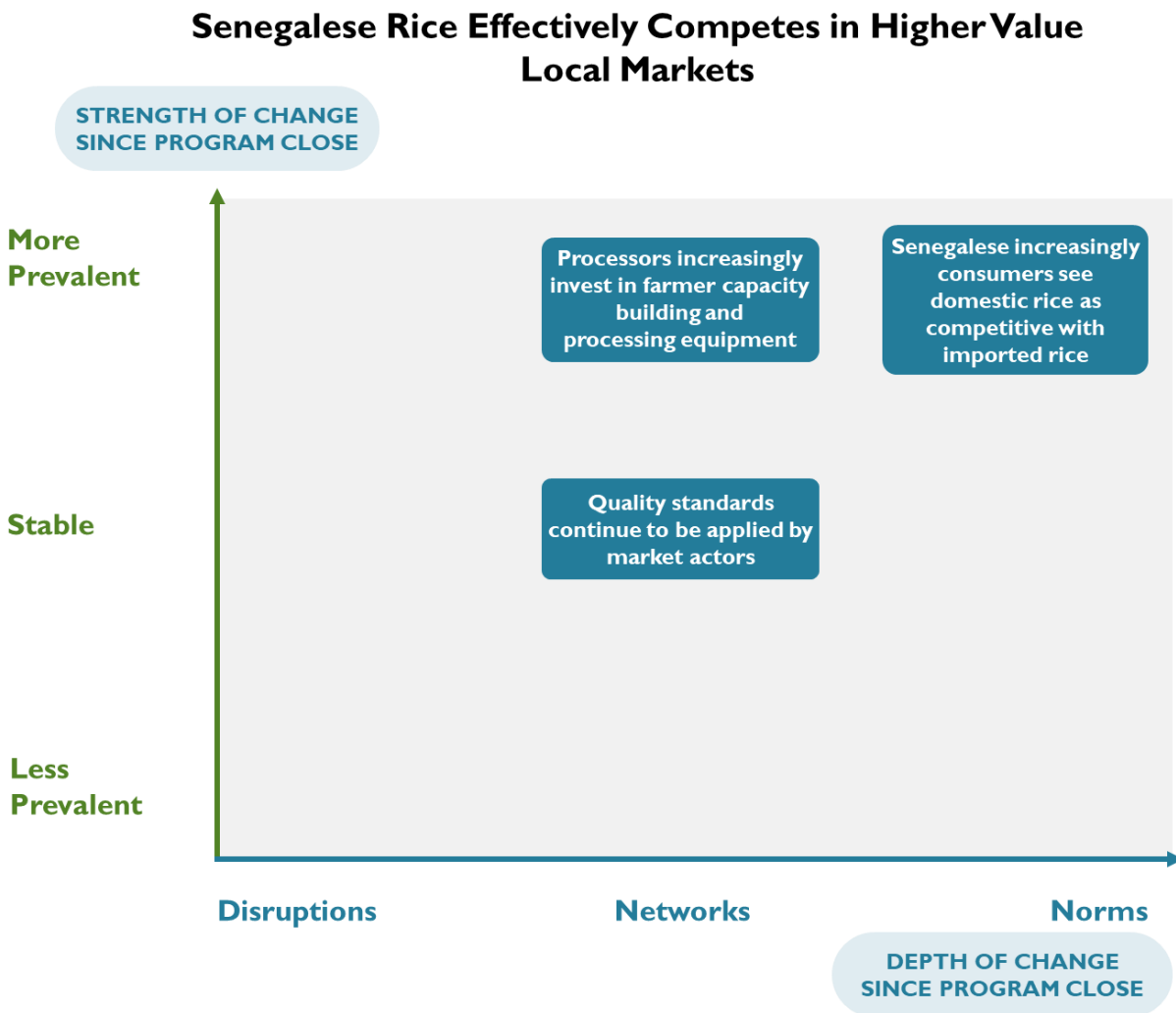
Quality standards continued to be applied by market actors at similar levels to project closure and had become a standard component of processor contracts with farmers. Investment into the rice sector has continued to expand, as has the norm among Senegalese consumers that domestic rice is as desirable as imported rice.

The following figure summarizes how aspects of this systemic change evolved between the end of Naatal Mbay and the ex-post evaluation. Each one is described in more detail below.

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<sup>18</sup> Soullier, Guillaume, Matty Demont, Aminou Arouna, Frederic Lancon, and Patricio Mendez del Villar. [The State of Rice Value Chain Upgrading in West Africa](#). *Global Food Security* 25, no. 100365, 2020

Figure 13: Evolution of Systemic Change: Competitiveness of Rice



***Quality standards continue to be applied in the rice sector.***

The ex-post evaluation found that compliance to agreed-upon quality specifications has endured since the end of Naatal Mbay. The standards introduced for paddy rice have remained an integral part of contractual frameworks between producers and processors. The TPHAs assess the quality of rice brought for storage in the warehouses they oversee and flag to the processors if they do not meet minimum standards.

***Some processors are now directly investing in their supplying farmers' quality systems.***

There is also clear evidence that **processors continue to invest in systems that enable them to both maintain and further improve the quality of both paddy and processed rice**. With the phasing out of Naatal Mbay – which had played a key role in capacitating producer networks to understand and adopt practices that respond to quality requirements – many processors have invested in setting up their own field extension systems through which they provide agronomic support to

contracted producers. This enables them to ensure that producers continue to apply the right techniques to produce high-quality rice. At the processing level, some processors noted that they recently invested – or plan to invest – in more sophisticated processing equipment (such as laser color sorters) to further improve the quality of white rice they produce. These investments further reinforce the strength of systemic change.

### ***Urban customers are consuming SRV rice brands.***

#### **The competitiveness of Senegalese rice in high value urban markets has endured since program closure.**

Although it is unclear whether new brands have been established since 2019, processors unanimously noted that domestic demand for their brands continues to increase, and that they are unable to fulfill clients' volume requests due to limited supply. There is a lack of quantitative data available in Senegal on the penetration of local white rice in higher value urban markets; however industry stakeholders, including at the Ministry level note a remarkable increase in consumption of rice from the SRV. In spite of the lack of data, the increase of large-scale rice processors, all of which indicated that they currently supply higher value urban markets, is clear evidence that Senegalese rice is reaching higher-value markets. Interviews with urban consumers indicated that they increasingly view local rice as fresher and easier to digest than imports.



*Processed rice stored in warehouse*

*Photo Credit: Laura Courbois / MarketShare Associates*

While Naatal Mbay played a key role in enabling these systemic changes, it is equally important to note the role that other actors, including the GoS, played in increasing demand for domestic rice. An important policy instituted by the GoS was requiring rice importers to purchase domestic rice proportionately to the volumes of their imports.

### ***Sustained and Scaled Gains for Target Groups***

Naatal Mbay aimed to create more inclusive, competitive, and resilient market systems that would benefit its target population of smallholder cereal farmers. In the context of its integrated finance model, the target population of smallholder rice farmers in the SRV are experiencing several gains.

**Although fewer rice farmers accessed seasonal credit directly through the IFM since program closure, adaptations of the model have resulted in broad access by farmers to secured credit.** As discussed under Systemic Change #1, the adverse effects of a series of shocks on rice productivity between 2019-2021 decreased access to seasonal credit provided by the LBA during that time frame.

*“Since 2019, we have stopped selling to processors because we are no longer eligible to participate in the IFM. Flooding and other shocks have affected farmers’ ability to produce sufficient quantities to pay back our loans with the bank. Since then, we have been forced to sell our paddy rice to ‘bana-banas’ (i.e., traders) through the informal market where the price is not fixed. We don’t have another option.” – Farmer group in Dagana*

Nevertheless, this did not necessarily translate into a broad decrease across the sector. In response to the reduction in seasonal credit provided by the LBA through the IFM, several processors have adapted the IFM in such a way that they themselves now act as credit providers to farmers and accept to be paid back in paddy. Some processors use their own funds to do so while others have been able to obtain production credit from FSPs to finance producers, thus absorbing associated risks. One processor describes the system as follows:

*“For many of our producers, we directly provide them with input credit. This is a type of IFM but is different insofar as the processor now becomes the ‘bank’ and that we have a direct relationship with the producers instead of going through an intermediary. Nevertheless, the bank is still involved peripherally, as they sometimes provide financing to the processors who in turn finance producers.” – Large scale processor in Rosso Senegal*

This adaptation uses the same contractual principles found in IFM contracts. In other words, producers are only required to repay their processors with a quantity of paddy sufficient to clear their debt (i.e., fractional selling). Producers are free to market any surplus rice inside or outside of these contractual arrangements, as is the case with the IFM model.<sup>19</sup> The key difference between the two models is the cost of financing to the producer. While some processors apply the fixed price, others offer lower reimbursement rates as they cannot compete with the subsidized rates offered through the LBA. Across the sector, farmers summarized the benefits and constraints of this adaptation as such:

*“The advantages of accessing input credit through processors instead of the bank is that they tend to be more flexible with repayment terms and eligibility criteria. This is especially beneficial for producers who are no longer solvent with the LBA and therefore can no longer access credit through the IFM. However, in a few cases, the price of paddy offered by processors is less than what is offered through the IFM. For example, last year, the fixed price for paddy through the IFM was CFA 130/kg while some processors were offering CFA 112,5/kg”. – FGD with farmers in Dagana*

The inability to obtain precise lending figures from the processors means the amounts they are lending and variations over time are unknown and cannot be estimated. LBA reports lending more than USD 5.5 million collateralized by the emerging warehouse receipt system model in 2022. Overall, this suggests that market forces are actually strengthening the prevalence of agricultural credit provision to smallholder rice farmers in Senegal.

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<sup>19</sup> This approach can help to facilitate trust among market actors, as described in MarketShare Associates and ACDI/VOCA. [Scaling Impact: Improving Smallholder Farmers' Beneficial Access to Output Markets](#). Washington: USAID, 2015.

**On the whole, income gains to farmers have been sustained due to an increase in the price of paddy.** Naatal Mbay anticipated that contracting through the IFM would result in increased profitability for farmers. It assumed that higher yields and better product quality, coupled with a favorable fixed price, would enable farmers to significantly increase revenue generated through paddy sales. Internal program monitoring and an impact assessment conducted at the end of Naatal Mbay found that farmer incomes had increased. This was largely driven by considerable yield improvement, greater land area shifted to rice production from other crops and uptake of commercialization which offered farmers a more advantageous price for their paddy. Although the ex-post was not able to collect quantitative data on farmer incomes, the majority of farmers noted that despite reduced productivity in recent years, incomes have been sustained due to an increase in the price of paddy.

Sustained demand (and competition) for paddy rice has boosted rice prices and thus reduced seasonal price fluctuations for processors. Harvest-time price dips are no longer taking place, and most buyers (processors and traders) are aligning with contract prices enforced by the banks on loan reimbursements. Some processors interviewed are paying above the government fixed price to purchase farmers' surplus rice, given the increasing demand for paddy rice and the reduced supply in recent years. As one processor notes, this surplus demand for rice benefits rice farmers:

*“Everyone is fighting for producers and their paddy rice. Processors are constantly looking for producer networks that are willing to sign contracts with them.” – Processor in Rosso Senegal*

Additionally, in order to offset the rising cost of agricultural inputs in recent years, the GoS introduced a subsidy in 2022 of roughly 23% above the previously fixed price. Farmers noted that beyond recent shocks which impeded productivity, the currently limited availability of irrigated land on which to produce rice is constraining their ability to increase their incomes.

**PCE/Naatal Mbay supported a broad shift in the dominant rice production period in the SRV from the rainy winter season to the summer season that has enhanced farmers' earnings.** Although more costly due to the irrigation costs associated with cultivating rice in the summer season, yields during that season are considerably higher than those achieved in the winter season (7-8 tons/ha compared to 3-4 tons/ha). The IFM enabled producers to access loans and make the necessary investments to benefit from these higher yields generated by controlled irrigation.

**Farmers largely have not started double cropping rice.** Although this was an aim for Naatal Mbay, a number of factors still constrain farmers' ability to grow rice on the same land in both production seasons. The short lapse of time between the two seasons means that farmers struggle to harvest and sell their crop, reimburse their loans, get approved for a new loan, and begin land preparation for the next season in time to plant. While Naatal Mbay expected the integrated finance model to help address some of these bottlenecks and enable farmers to start producing twice a year, this has only happened on a very small scale and most farmers continue to only produce rice during the dry hot season. Some of the barriers to double production, according to producers, include delays in credit approval and disbursement, and shortages of harvest mechanization services at peak times throughout the production cycle. Some key informants suggest that increasing investment in more lucrative onion and tomato production also partially accounts for farmers' reluctance to plant rice



during the colder season. Trade data supports this, indicating that Senegalese exports of onions have increased by 85% since 2019.

**Overall, farmers report significant satisfaction with the IFM, and the benefits accrued from it.** The three key drivers of use among farmers include: fixed prices for paddy, access to affordable seasonal credit, and efficiency of marketing. The ability to access input credit is particularly pertinent to farmers given the rising cost of agricultural inputs in recent years, largely driven by Russia’s war in Ukraine and global inflation. While the overall provision of input credit through the IFM has decreased, bank records reflect a 13% increase in the average value of credit provided per rice farmer group through the IFM, from the CSC 2019 to CSC 2022. The banks’ ability to respond to the credit needs of farmers, particularly in the face of shocks and rising costs of production, has greatly contributed to farmers’ satisfaction with the model. Moreover, farmers value the IFM model as it has continued to create a secure market for them, allowing them to sell their paddy at a stable price, and removing barriers to timely payment. Farmers noted that:

*“Marketing through the IFM model is much easier and more reliable as it enables producers to reimburse their credit within a specific timeframe and ensures a guaranteed market compared to other marketing channels. The prices are the same whatever the situation, which helps us cover production costs.” – FGD with farmers in Dagana*

**No significant gender differences were observed, in regard to benefits derived from participation in the IFM model.** Given the focus of MSD approaches on inclusivity, the ex-post evaluation sought to understand whether the gains experienced by the target population as a result of the systemic changes had also accrued to female producers. The study did not find any material differences in how the model affected male and female farmers with regards to increased production, increased income, and access to credit. This likely stems from the fact that, in the SRV, women are heavily involved in the production and sale of irrigated rice. Figures from the FTF Dooleel Mbay Activity Baseline Survey conducted in late 2022 confirm this and show that, on average, male irrigated rice producers earn just 1.4% more in gross margin per hectare than female producers.<sup>20</sup>

There was a consensus among all producers – female and male farmers alike – that farmers benefit equally from the IFM model. However, some groups noted that female producers have a high propensity to be involved in rice processing – albeit on a small-scale – compared to men. Thus, the study found several instances of female farmer groups processing their surplus rice themselves rather than selling it to processors. Through greater value-addition these female farmers are able to fetch higher prices.

## ***Implications for Programming***

### **Implications for Programming in Senegal**

When PCE started, it was among the first programs using a system-oriented approach to economic development. It and Naatal Mbay collectively suggest several implications for agricultural programming in Senegal.

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<sup>20</sup> IPAR. *Feed the Future Senegal Dooleel Mbay: Baseline Study (not yet publicly available)*, 2023.

First, **a predominant focus on farmer productivity will rarely create necessary changes on its own.** It can be an important step along the path to enabling Senegalese agricultural products to reach target markets, but identifying and linking to market opportunities often creates more powerful incentives for behavior change.

**Donor-financed infrastructure investments are better dedicated to more slowly depreciating assets.** Donors have historically financed crop storage warehouses and agricultural equipment like tractors in Senegal. While such investments are often market distorting and result in crowding out private investment, the legacy of these investments in Senegal suggests that the more slowly depreciating irrigation infrastructure and warehouses have created longer-lasting benefits than equipment subsidies that require higher ongoing maintenance. While accessing equipment for mechanizing key steps in the agricultural cycle is important for double cropping, more market-based approaches such as the development of a market for agricultural leasing pursued by Naatal Mbay tend to generate longer-lasting impact.

**Working with government-led institutions adds new layers of complexity but also can provide more security around financing.** MSD programming tends to default to working with the private sector but experience from numerous MSD programs has repeatedly shown the importance of engaging government. Senegal is no exception, where the government prioritizes and plays a major role in the agricultural sector and is thus a natural and sometimes essential partner. Experience from numerous MSD programs has repeatedly shown the importance of engaging government. Nevertheless, models built on the buy-in of government may face additional risks if future policy reverses developmental gains. **Private capital – including from smaller and informal businesses – will invest in agriculture when opportunities exist.** The speed at which the private sector invested in rice processing once conditions improved is a powerful sign of the potential for change. Notably, a significant portion of this investment came from enterprises that were previously operating within the informal sector and that are frequently overlooked or even targeted for eradication in a push to formalize markets.

**The certified seed sector can also benefit from the IFM.** Slow distribution of certified seed impedes double rice cropping. The application of the IFM with certified rice seed producers would speed up the production and distribution of seed. Doing so would require a complementary investment in specialized warehouses with the necessary conditions to properly store the certified seed.

## Implications for Broader MSD and Economic Development Programming

The Naatal Mbay program suggests several implications for designers, implementers and evaluators of economic development programming:

### Program Design Implications

**Start with market demand.** When PCE started, the rice value chain faced a multitude of problems. Prioritizing was critical, and PCE realized that creating urban markets for local rice would build incentives for behavior change among market actors that could resolve other problems. Accordingly, its initial focus was on improving quality standards so that Senegalese rice could reach higher value urban

markets. This included establishing quality standards, consistently enforcing them, and ensuring quality seeds were available that would improve seed homogeneity. Once quality improved and demand for local rice among urban consumers began to increase, they then shifted to addressing other core issues.

**Work with partners that have the right incentives for change.** The changes that Naatal Mbay encouraged processors to adopt, like formally contracting suppliers and improving quality standards, were only valuable for those that were targeting higher value markets. They have little commercial logic for the smallest processors producing poor quality rice for rural markets. Accordingly, Naatal Mbay focused on working with the businesses seeking to reach higher value markets.

**Small-sized and mid-sized firms in the informal sector are oft-overlooked change agents.** Many of the currently mid-sized rice processors in Senegal who took advantage of the opportunities created by the formalization of the rice sector emerged from among a large pool of artisanal-style mills operating in the informal sector. Naatal Mbay actively sought to engage with and encourage these entrepreneurs to invest in expanding and upgrading the quality of their processing equipment. Naatal Mbay's focus on these actors contrasts with some MSD programs that primarily focus on partnering with already large businesses operating in the formal sector.

### **Systemic Change Implications**

**Successful models often build on a series of earlier successes and pre-conditions.** Advances in productivity via the introduction of the Africa Rice SAHEL suite of varieties, donor funding for warehouse construction, the mainstreaming of certified seeds, the existence of a government-owned agricultural bank with an interest to advance the rice sector, the existence of large-scale producer organizations and unions of producer organizations, etc., all supported the feasibility of developing the IFM model.

**Existing, successful models are often good candidates to be adapted.** The IFM represents a concrete example of an "exaptive design process" that repurposed core practices and services already being applied in the port of Dakar by rice importers, collateral managers and banks to finance high volume rice imports. The existing use of a third-party holding system in the imported rice value chain demonstrated the potential applicability of that model elsewhere in the agricultural sector and provided a base of specialized firms with which to adapt existing practices. Moreover, the existence of that model meant it was well-understood by processors, banks, collateral managers and the GoS.

**Change often spreads within a system by people bringing ideas with them.** The primary way that the IFM model spread in Senegal is via the former staff of Naatal Mbay and PCE moving on to the private sector (including LBA, BNDE and Locafrique) and leadership in other USAID-funded agricultural activities. When they joined those entities, they designed institutional policies and practices (in the case of BNDE) or designed similar interventions in a new sector (in the case of another USAID-funded agricultural development program). Similarly, staff within LBA and BNDE that worked to apply the model with Naatal Mbay in the SRV have subsequently transferred to other regional offices of those institutions and began applying the IFM in their new locations. This aligns with the findings of a previous ex-post study of a USAID-funded program in Cambodia, where staff of the first innovator were largely

responsible for spreading the model as they left to start their own companies or work for others.<sup>21</sup> This observation challenges the assumption that learning transfers between organizations are the primary hurdle to adoption. Knowledge transfers within organizations may happen slowly if at all. It cannot be assumed that successes in parts of an organization will spread naturally. An implication for programming is that learning investments should consider intra-organizational learning transfers.

**Co-development of initiatives builds strong ownership.** PCE and Naatal Mbay directly involved LBA in the development and implementation of the IFM. Reminiscent of the saying that “success has many fathers”, many of the key informants who were interviewed took responsibility for the creation of the IFM. The widespread pride among many respondents for the success of the IFM has undoubtedly contributed to their enthusiasm for spreading and replicating it as they advanced in their careers.

**Systems change takes time.** Naatal Mbay built on a series of changes that were introduced during PCE. The series of transformations created by the two programs would not have been feasible in a five-year period had Naatal Mbay not been funded.

### **Agricultural Finance Implications**

**Agricultural commodities have the potential to be a powerful source of collateral.** In many agricultural value chains, the value of the commodities being exchanged far exceeds the value of the fixed assets in use. Accordingly, collateralizing those commodities can facilitate much more agricultural lending than would otherwise be possible. In the Senegalese rice sector, a standard 1000-ton warehouse costing USD 150,000 to build can typically store paddy rice worth USD 300,000. Agricultural commodities thus represent a hidden source of collateral in many contexts.

**Models like the IFM envision credit as a tool for trade facilitation.** In this paradigm, the aim is not to maximize the profitability of a single loan (for the FSP) or a single rice shipment (for processors). Instead, profitability is optimized when market actors maximize the volume of rice that they are purchasing, processing, and selling. This high volume, low margin model sees credit as a financing instrument that speeds up the pace at which transactions occur. This required a paradigm shift for many Senegalese market actors towards maximizing speed of processing.

**The financing contract – rather than the sales contract – is the primary trade facilitation tool.** Over time, Naatal Mbay grew to realize that farmers’ financing contract with processors was the lynchpin that cemented commercial relationships, not the sales contract. While the sales contract helped to outline quality expectations, farmers were most concerned with having continued access to finance and so would do whatever they could to avoid defaulting on their financing contract. Accordingly, it was critical that financing was closely linked to the sales contract to reinforce the key elements of the IFM. Moreover, Naatal Mbay found that rice farmers were much more likely to default on their input loans before they were tied to rice processor financing.

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<sup>21</sup> MarketShare Associates. [Scaling Impact: Cambodia MSME Ex-Post Assessment](#). Washington: USAID Leveraging Economic Opportunities (LEO), 2016.

**Commoditizing agricultural products requires a supportive legal framework.** The support of the International Finance Corporation to the Government of Senegal in creating a special legal status for a grain receipt was critical. It meant auditors recognized financial institutions' lending as being backed by a legal financial instrument, allowing them to lend far more than they otherwise could have.

**Markets will commonly right-size development initiatives.** The banks' and farmer organizations' adaptation of data collection and management technologies is a good example of market actors' propensity to find the simplest (and often cheapest) solution that will achieve their aims. Overly complicated and expensive data systems will commonly be unused or jettisoned by organizations large and small.

## *Conclusions*

The findings of the Naatal Mbay ex-post evaluation help to build the evidence base for the scale and sustainability of programs applying an MSD approach. Naatal Mbay and the IFM that it introduced have left a significant mark on the Senegalese agricultural sector that is continuing three and a half years following program closure. This has happened most significantly in the rice sector where it was first applied, but it is increasingly improving access to finance within other value chains as well.

As one in a series of ex-post studies being conducted by MSP until 2026, this ex-post marks the first contribution in what will be a growing base of evidence to help address this important research question.

## Annex I: Interviewee Targets and Actuals Achieved

Market System Actor Type	Specific Type of Actor	Target	Actual	Notes
FSP	Participating bank	2	2 banks	Five interviews in total were conducted with LBA staff.
	Non-participating bank	2	3 banks	
Rice processors	Processors using the IF model	19	11	At the time of the research, there were 11 processors actively using the IF model in the rice sector. Leadership with processors was predominantly male with the exception of 1 female processor.
	Processors no longer using the IF model	9	50	
Producer networks	Producer networks using the IF model	35	30	
	Producer networks not using the IF model	6	7	
Smallholder farmer groups	Participating smallholder farmer groups continuing to use the IF model	10	12	26% of FGD participants were female producers.
	Participating smallholder farmer groups that no longer using the IF model	10	9	
	Non-participating smallholder farmer groups using the IF model	5	5	
Other stakeholders	This includes third-party holding company, government officials, program staff, and other market actors	10	19	

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