**Linking poor smallholder farmers to markets:**

**Insights from an inclusive rice value chain development**

**pilot in Côte d’Ivoire**

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Acronyms

ADERIZ (*Agence pour le Développement de la filière Riz*)

BRAC Bangladesh Rural Advancement Committee

CIG Commercial Interest Group

(*GIC – Groupement d’Interet Commercial*)

CT Cash Transfer

FCFA Franc of the Financial Community of Africa

(*Franc de la Communauté Financière Africaine (CFA))*

FTE Full Time Equivalent

IE Impact Evaluation

MFI Microfinance Institution

OIA-Riz (*Organisation Interprofessionelle Riz*)

ONDR National Rice Development Office

(*Office National du Développement de la Riziculture*)

PFSP (*Projet Filets Sociaux Productifs)*

PU Processing Unit

RCT Randomized Control Trial

SME Small- and Medium-scale Enterprise

SNDR (*Strategie Nationale pour le Developpement de la Riziculture)*

TAP Technical Assistance Provider

WBG World Bank Group

Exchange rate: 1 US$=613 FCFA (10 Nov 2023)

# Overview

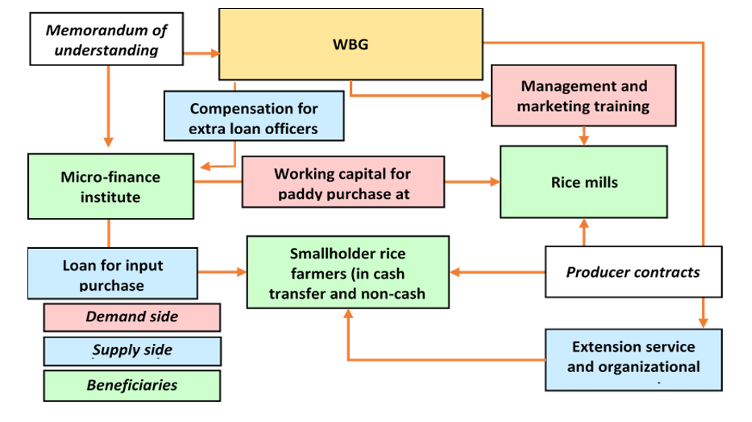
**In low-income settings, better jobs in agrifood hold much potential for poverty reduction.** Yet, integrated approaches that tackle multiple market constraints at once are needed. Inclusive value chain development (iVCD) with contracting arrangements is increasingly the organizational tool of choice to do so. Contract farming generally pays off, but typically only involves the more advanced farmers and typically concerns cash crops. Yet, rising staple crop productivity is also of particular importance for poverty reduction given the larger growth and poverty multipliers. There is overall also little robust empirical guidance on what specific iVCD interventions maximize gainful, inclusive employment. It raises the question whether iVCD can also be made to work for staples and how. Furthermore, economic inclusion programs (cash+) that help cash transfer (CT) beneficiaries leverage their cash transfers to engage in more remunerative activities, are increasingly promoted to accelerate poverty reduction. With most CT beneficiaries engaged in subsistence staple crop production, it raises the additional question whether iVCD could also be used to help poor CT receiving farmers leverage their CT to produce for the market and raise their incomes.

**Against this background, the rice smallholder iVCD pilot project was initiated in Côte d’Ivoire.[[1]](#footnote-2)** It was further motivated by strategic, conceptual, and operational considerations. Strategically, rice is widely grown in Côte d’Ivoire, but still insufficient to meet growing urban demand. Import substitution offers important opportunities for “better-employment” generation on and off the farm. Second, the focus on rice is of interest conceptually for learning about iVCD more generally, and its potential for staple crops in particular. Finally, the World Bank Côte d’Ivoire Productive Safety Net Project (PSNP) which distributed cash transfers in the northern half of Côte d’Ivoire offered the Pilot team a practical opportunity to test iVCD as an alternative to the more traditional package of interventions offered under economic inclusion which focus on supply side constraints (skills development, investment loan, savings opportunities) and assume that the demand for the goods and services the poor can produce is available.

**Within the iVCD pilot, three different domains of tension are explored, each time with an eye on brokering sustainability and facilitating scale up.** First, the equity orientation of the pilot (improving the livelihood of cash transfer beneficiaries) has to be traded off against efficiency and sustainability considerations. Buyers and agricultural service providers typically target larger, commercially oriented farmers to maximize volume/sales and to minimize transaction costs. Second, the gains from market complementarity and the resolution of multiple market constraints at once must be balanced with the challenge of increasing operational complexity. Third, how are public resources be used best when supporting iVCD. For example, should support be focused on temporary input price support (subsidization) to bring inputs within reach, help stakeholders familiarize themselves with new inputs and products, and reduce risks, or should they focus on technical assistance and reducing transaction costs instead, and which approach is more sustainable and scalable?

**To address these questions, a contracting arrangement between smallholder rice farmers in three regions in Côte d’Ivoire, three medium sized rice mills (one in each region) and a financial institution was set up and followed during three years.**  The rice purchasing contractbetween the local rice mill and the producers stipulated the farmgate purchase price and quality at harvest as well as the quantity to be delivered. It also formed the basis for obtaining input credit for the producers and determining the amount of working capital for the PUs after the harvest. All modern inputs and credit were provided on commercial terms. There were no direct input or credit subsidies provided by the Pilot. Instead, it focused on facilitating interaction and establishing trust between the partners, to reduce transaction costs arising from coordination and contract enforcement, which were expected to be particularly high at the beginning, as well as capacity building of the actors (including extension for the farmers and technical assistance to the millers regarding the technical and financial operation of the mill). A national and three regional coordinators facilitated the interactions between he partners locally. The program ran for three years and adjustments in farmer targeting criteria and project implementation modalities were made each year. The Pilot further implemented a careful data strategy to serve both activity management and impact evaluation purposes.

Figure 1 – Pilot Stakeholders and Main Interactions



**Yields and contract compliance increased substantially over the course of the project, establishing the feasibility of profitable lowland rice production, but participation also substantially declined.** Yields more than doubled from 1,2 t/ha in 2019 to profitable levels of 2.7 t/ha on average in 2021**.** This followed a tightening of the farmer selection criteria to ensure profitability and came at the expense of a dramatic decline in participation (from 541 participants in 60 villages in 2019 to 137 participants in 20 villages in 2021), and a decline paddy sales commitments from 474 tonnes in 2019 to 124 tonnes in 2021.

The participation of cash transfer recipients also declined as the project shifted towards more commercially oriented rice farmers.[[2]](#footnote-3) Contract compliance greatly improved, with the committed paddy fully delivered (up from 38 percent compliance in 2019) and virtually all farmer credits fully reimbursed in year 3. The price quality premium experiment further showed promise as a tool to foster quality paddy rice delivery by the farmers. The experience of the third year provided a good basis to build on for scaling and sustainability. At the time of Pilot closure, the scale reached was insufficient to be profitable for the millers and further maturing of the contractual relations was needed for sustainability.

**The experience yields a number of important lessons for scaling and establishing sustainability which had not yet been established by the end of the Pilot.** Through three years of implementation, the rice Pilot achieved important positive outcomes. These were bolstered by mid-course adjustments, but had yet to firmly root self-sustaining value chain coordination on improved practices amongst Pilot partners. The positive outcomes achieved do point the way though towards the key elements that would build towards sustainability and scale. They were reached through choices on technology, organization, economic instruments and strategic sequencing.

**First, on technology, significantly improved harvest yields and farmer net revenues were achieved using improved seed varieties and fertilizer, bolstered by credit to enable input acquisition and agronomic advice**, and attended over the three years by progressive improvement to solid credit reimbursement rates. The technology dimension included a sharpening of farmer targeting criteria, especially focusing on a minimum level of water control for farmers to handle the risks associated with higher cash requirements for inputs and mechanized services. The introduction of the upfront 10 percent credit downpayment introduced in the third year of the Pilot provided a powerful mechanism for incentive compatibility and contract compliance, with committed farmers more likely to selfselect and comply with the rice delivery and reimbursement terms of the contract. Substantial investment in extension and farmer accompaniment proved key. Increasing access to mechanization services will be an important next step.

**Second, the Pilot’s organizational architecture anchored around locally based project liaison agents and supported by data collection and analysis to improve cooperation and coordination across value chain partners proved indispensable and effective.** Avenues of cost reduction in coordination activities are available. Coordination costs also come down automatically as the procedures consolidate, value added at village level is demonstrated, and more villages and farmers per village join, driving down the administrative cost per unit for the mills, the credit institution and the Pilot coordination. The organizational approach also made headway over the Pilot implementation on improving trust amongst the participants. Having the mills be responsible for the hiring and management of agents who managed the relationship with farmers towards getting the quantity and quality of production enabling contract fulfillment was a winning formula. Finally, the Pilot’s investment in farmer organization at the village level (GIC) as well as Region (inter-GIC) paid dividends in aggregating and consolidating farmers’ voices, bringing this to bear on improved prices and quality of acquired inputs, and in facilitating interaction with the other partners of the value chain.

**Third, the introduction of a contract between individual farmers and mills was the core economic instrument brought by the Pilot into the rice value chain to improve coordination and predictability on higher quantities and better quality**. Contract performance improved over the three years and the price premium for improved paddy quality was incentivizing farmers, illustrating the importance of continued experimentation with contract design. Accompanying measures also proved to be important, particularly improving farmers' access to mechanized harvest threshing, which facilitated delivery on quality terms of the contracts. Further investment in developing the machinery service value chains in the region to increase their availability will be key for scaling, as will be support to further develop the GICs to better access these mechanization services by synchronizing planting and harvesting to aggregate demand.

**Fourth, the Pilot’s orientation on strategic sequencing appears to be validated by implementation experience**. Priority from the outset was put on profitable on-farm productivity improvement and became the core focus. This was essential to produce the value-added lubricant essential as motivation to the participants to commit the additional efforts needed to gain other efficiencies up in the value chain (including participation density, volume and quality). Subsequent efforts will need to build on this for scaling including by increasing participation at village level. Inclusion should follow either directly, by pulling in new, less advanced farmers through demonstration effect or indirectly, through the labor market, by creating demand for on farm laborers as well as off-farm employment generation as incomes increase.

**Nonetheless, several challenges remain. First, the costs of technical assistance and capacity building provided to the mills on an individual basis are unlikely to be sufficiently compressible to be scalable;** shifting to a small business incubator model where support is more wholesale than retail, and perhaps provided anchored in a business association, may have better prospects.[[3]](#footnote-4)

**Second, overall stakeholder coordination costs remained high with no solution apparent within the Pilot’s framework.** An important aspect of coordination in value chains is stakeholder negotiation and establishment of shared objectives and then squaring this with available budget (and human) resources and agreement on a work and expenditure plan. This dimension of value chain stakeholder coordination was only minimally navigated during the Pilot since the finance for the activities was mobilized externally (grant funding) by the World Bank, and the Pilot coordination structures did not provide the value chain stakeholders with authority over budget allocation and expenditure monitoring. By the closing of the Pilot’s activities in 2022, there was no post-pilot administrative or financing mechanism in place, either at region or national levels, to which to pass the baton of responsibility for supporting activities for continued value chain strengthening. Despite progress with structuring the national inter-profession (OIA-Riz), this had yet to identify a financing source and governance mechanism that would enable it to absorb the functions of the Pilot’s WB-financed coordination activities.

**Third, the three millers of the Pilot’s regions were not yet implementing marketing strategies sufficient to insert them into the improved (semi-luxe) segment of the domestic rice market** with the higher prices that such marketing progress would make accessible. Not until there are demonstrated and proven pathways for millers to reliably sell an improved product into this market segment will there be higher prices passed down sustainably to farmers through contractual terms.

**Fourth, contractualization needs further maturation beyond the accomplishments under the Pilot.** The focus on building trust between farmers, the mills and the financial institution must continue. The contract terms on quality need further strengthening such as improving transparency on quality and its determination, and on the specification and delivery on the quality-related price premium. To guard against side selling, there may also need to be investment in designing a pricing formula that allows for adjustment to the delivery price of paddy in the event of market price changes between planting and harvest/delivery. Timeliness in credit provision at reduced transaction costs could still be improved, with the digitalization of financial services holding great promise in this regard.

**Fifth, overall, establishing iVCD calls for long-term public sector involvement.** Establishing profitability at farm level is the starting point, including to establish profitability amond the other stakeholders. Yet, sustained public sector effort in terms of research, extension and water control is key. Partial credit guarantees may also be necessary at the beginning to pull financial institutions in at the beginning. Also possibly needed is transition finance in the system to help the inter-profession get off the ground, and possibly a public sector finance platform for the interprofession to efficiently mobilize revenues. Finally, the public sector may need to remain present as the “police” for credible enforcement of “rules of the game” that the inter-profession may decide upon and help broker. As a neutral third party, it can also help negotiate a fair distribution of the risks and value added among the different stakeholders and act as voice for the poorer smallholders and SMEs to ensure they also benefit (directly or indirectly) over time.

**Some of the Pilot learnings also carry over to inclusive value chain development and its study more broadly. Following core insights emerge**:

1. **Start small and simple with an initial focus on establishing profitability, and grow.** Value chains and contract farming substantially increase the interdependence among stakeholders. This makes them vulnerable to non-compliance by one of the partners, often a key reason why collaboration and coordination hadn’t happened to begin with. With the judicial system typically weak and legal contract enforcement costly, trust must be relied on instead. It makes increasing trust among the stakeholders a core preoccupation. In this, establishing profitability early on helps grease the wheels, as does open consultation and transparent decision making. Simplicity in protocols as well incentive compatible contract design are also favored. Building on existing organizational structures (farmer organizations) and informal partnerships among stakeholders helps reduce the burden, as does working with slightly more advanced, reliable stakeholders and their partners.
2. **Prepare well by establishing competitiveness beforehand, but especially build in mechanisms for learning and feedback loops.** Much can be learned beforehand about the competitive nature of the endeavor, its profit potential, and the capacity and motives of the potential participating stakeholders. Selection of participants often works best by fostering competitive self-selection among smallholder farmers both through exclusionary eligibility criteria (e.g. with regard to endowments) and a downpayment on the credit as well as business competitions to select the other stakeholders (mills, input providers, buyers, financing institutions) to support/lead the chain. In this, risk sharing arrangements should be promoted from the start, some of which could initially be further supported by third the party intermediaries. Tight selection criteria and competitive self selection will have to be traded off against sufficient scale to begin a minimally viable ecosystem.
3. **Social objectives are achieved indirectly over time, through spill-overs in learning and access to inputs at the village level as well as the local labor markets.** Sustainability and scaling demand establishing profitability early on. A disproportionate focus on the smallest, most subsistence oriented or cash tranfer receiving producers may raise the hurdle too high to do so in the beginning, when contracting arrangements and protocols are still being worked out. Poorer producers likely benefit over time and indirectly as observed in Tanzania following support to the slightly larger farmers[[4]](#footnote-5). They may benefit as producers, through better local access to knowledge, inputs and machinery services, or through the labor market, as agricultural wage on other farms or through engagement in off-farm activities as the local economy develops.
4. **Long term public support is key.** iVCD takes time to settle and scale. Sustained public sector effort in terms of research, extension and water control is key, especially for staple crops where the scope for value addition is lower. To sustain the coordination efforts, the development of a self-financing interprofessional organization is key, which likely needs transition finance to get off the ground before it can be sustainted through membership fees. Finally, a neutral third party remains likely key to help negotiate a fair distribution of the value added across the different stakeholders, act as a voice for the poorer smallholders and agribusiness SMES and mediate disagreements.
5. **More flexible and comprehensive approaches to evidence generation and action learning are needed to study what works in iVCD.** The methodological toolbox currently popular among applied economists often does not lend itself very well for iVCD analysis. RCTs are very powerful to carefully establish the causal effect of a particular relationship or contract design feature (as with the quality price premium). This is useful, yet, many more of them should be done, and external validity is often limited as the results follow from many intervening factors. It also provides a very partial picture only. Others have focused on evaluating the effect of iVCD or contract farming in general, but this in turn is limited given the many different ways to set up and implement the contracts, making it hard to identify what exactly one has evaluated. More operationally oriented research designs are needed that engage with the many and evolving decisions farmers and supply chain actors make throughout the campaign, which make randomization hard and its relevance at times also limited. For example, as demonstrated in the rice Pilot and highlighted by Bellemare, Bloem and Lin (2021, p15): “*offering contracts to farmers by placing them in the treatment group at random fails to mimic farmer selection by processing firms which, in a market economy, is anything but random*”. Randomization should focus on farmers that are likely to be selected by the processing firms instead. More attention to the agribusiness firms’ perspective and firm economics is generally needed. Studying iVCD will also require more qualitative and system-oriented research approaches.

# Introduction

**In low income settings, better jobs in agrifood hold much potential for poverty reduction.**

Poverty remains widespread in Africa, most of it rural, with livelihoods still predominantly anchored in agriculture.[[5]](#footnote-6) The sustainable path out of poverty are better jobs.[[6]](#footnote-7) Agricultural growth has been shown to be particularly poverty reducing, especially in low income countries and low income settings within countries, and when smallholder farming dominates.[[7]](#footnote-8) Agricultural growth raises farmers’ incomes more directly, thereby endogenizing poverty reduction through economic growth. It can also have important multiplier effects, creating jobs off the farm in the agricultural value chains through back and forward linkages as well as by raising demand for locally produced non-food goods and services through consumption linkages following higher farming incomes for many.[[8]](#footnote-9)

**Integrated approaches are needed to overcome Africa’s lagging agricultural performance.** Despite some progress, in much of Africa agricultural productivity is substantially lagging. The gap between attained and agronomically attainable yields remains high[[9]](#footnote-10) and agricultural labor productivity and incomes low. Adoption of modern cultivation techniques has been limited and technological progress stagnant.[[10]](#footnote-11) The emerging consensus is that no single constraint can explain this evolution alone. Different combinations of constraints bind for different farmers. An integrated approach is needed, tackling different market constraints simultaneously, in input (fertilizer, seed, machinery), factor (finance, land, labor) and output (infrastructure, transaction costs) markets.[[11]](#footnote-12)

**Little evidence exists on the effectiveness of packaged interventions**, however, let alone on the appropriate mix, the adequate sequencing, or the effectiveness of different governance arrangements. The available evidence further shows that multifaceted programs have not always been successful either, such as the Integrated Rural Development Programs of the 1970s and 1980s, or only yielded limited effect, such as some of the community driven rural development programs.[[12]](#footnote-13) Integration can generate important synergies, but also increases operational complexity, challenging effective implementation, especially in institutionally weak environments and/or when pursued at scale.[[13]](#footnote-14) The essential elements of what makes a comprehensive intervention successful and under what conditions remain unclear.

**When demand exists, attention can focus on alleviating supply constraints as pursued by economic inclusion programs.** Theoretical work shows that when multiple market constraints bind, lifting the demand/output market constraint is the first step (Keenan, 2023). High transaction costs to access output markets rapidly block participation in any of the other supporting markets (input, credit, land). A new generation of economic inclusion (or cash +) programs is built on the premise that demand for the goods and services the poor can provide is present locally (i.e., the market is there). It then focuses on complementary support to help cash transfer receiving individuals increase their earnings by catering to this demand.[[14]](#footnote-15) The approach builds on the BRAC graduation approach, which supports extremely poor and vulnerable households to develop sustainable livelihoods.

**The emerging evaluations of economic inclusion programs are supportive.** In addition to giving cash to ensure basic consumption, graduation programs (now going under the nomer of economic inclusion) provide a package of (entrepreneurial and/or psycho-social) skills training, seed capital to jump-start an economic activity, financial education and access to saving options, and mentoring to build confidence and reinforce skills. The emerging evaluations confirm positive effects on consumption, resilience and poverty reduction.[[15]](#footnote-16) With the same integrated package rolled out across the target area/population, economic inclusion programs are also easy to scale up, and increasingly popular.

**In agriculture, demand also exists, though access to remunerative consumer markets is often elusive for smallholders and met by imports.** Many of the poor remain active in agriculture, with urban food consumption growing rapidly following economic growth and urbanization, especially in Africa. This growing urban food demand is often met by imports. In principle, this growing urban food demand could also be supplied by local producers. It suggests important employment and income generating opportunities in the agri-food system, on and off the farm, in the producing rural areas and connecting towns. It generally requires the capacity to provide a steady and voluminous stream of quality foods (or quality resource material for processing such as barley for beer brewing, as in Ethiopia).

**Nonetheless, when technologies are sufficient, farmers have also shown to manage to connect to urban markets, typically through contracting arrangements.** Despite the challenges, farmers have also shown show to be able to overcome the different market constraints when technologies are sufficiently profitable, i.e. when technologies increase yields enough or when the new or quality products enable fetching a sufficiently higher price, such as with cocoa in Ghana and Côte d’Ivoire, flowers in Kenya and Ethiopia, and improved cassava in Nigeria.[[16]](#footnote-17) Often such production happens in contracting arrangements, whereby buyers (or input providers) provide agronomic advice, credit for inputs, and price/output risk mitigation, in return for a steady supply of high quality products in sufficiently large volumes.

**Contract farming generally pays off, but is typically confined to certain participants, crops, and settings. Those** participating incontract farming have generally been shown to see their welfare increase. Contract farming also stimulates demand for hired labor, generating employment, though with little evidence of spillovers to the rest of the community. Yet, participating farmers typically tend to be slightly better off to begin with and the conditions and arrangements under which contract farming increases welfare and reduces poverty, and how it can be supported, remain poorly identified.[[17]](#footnote-18) When the scope for value addition is limited, for example, as is typically the case for staple crops, contract farming proves challenging. Yet, staples are also an area where potential gains for broad based increase in agricultural labor productivity is large. Many of the poor continue to engage in staple crop production, most of them for subsistence, absorbing a substantial share of their agricultural labor, while yields and labor productivity in staple crop production remain low.[[18]](#footnote-19) It raises the question whether their incomes could also be increased by linking them to more remunerative markets through contracting arrangements.

**Inclusive value chain development (iVCD) is increasingly the organizational tool of choice to help farmers transition from subsistence to market orientation, often anchored around large firms.** iVCD brings different value chain actors together to help them understand and overcome each other's constraints through risk sharing and better coordinated actions, often expressed in contractual arrangements.[[19]](#footnote-20) Different actors can drive iVCD**.** Large domestic or international firms up or down the chain can take the lead (“pulling from the top”). With greater technical expertise, deeper financial pockets, and further market reach (including abroad), they are often seen as better placed to pull the chain. Households can benefit as outgrowers or through the labor market, through their employment as wage workers. While this has been shown to reduce poverty, concerns about inclusion and the equitable distribution of the value added remain.[[20]](#footnote-21)

**Value chain integration and coordination can also be initiated by larger producers or smallholder producer organizations** (“pushing from the bottom”). Smallholders often organize in producer organizations to increase volume, increase their bargaining power, facilitate access to technology, and make themselves more attractive to buyers by reducing transaction costs. Yet, producer organizations often struggle to perform these roles, with externally initiated producer organizations shown to perform worse than community-initiated ones.[[21]](#footnote-22)

**Increasingly, it is non-VC agents, such as governments, NGOs, and international organizations that take the initiative (“mediating from the middle”).** They can help reduce transaction costs and provide complementary public goods and services. As a third, neutral party, they also help establish trust among the stakeholders, facilitate a fair distribution of the value added, and mediate in case of conflict.[[22]](#footnote-23)

**iVCD takes on many forms and support can be generic or specific.** Contract arrangements can be bilateral or multilateral, also involving financial institutions; they can range from informal to fully formal.[[23]](#footnote-24) iVCD support can be generic, aimed at improving the business environment (infrastructure, streamlining bureaucratic processes, reduction of corruption). It can also be specific, focused on a particular value chain, including through organizational assistance to farmers or farmer organizations, financial support to larger firms through equity financing, matching grants or guarantee funds, or the establishment or support of multistakeholder platforms.

**There is little robust empirical guidance on what specific iVCD interventions maximize gainful, inclusive employment.** Operationally, many questions remain, particularly, how external intermediaries can best support maximizing gainful, inclusive employment. Which chains and actors to choose (staples vs cash crops; SMEs or large firms), how to select them (bottom-up/top-down), what type of contractual arrangements to promote (knowledge/credit; fixed/variable price; quantity/quality; commercial/subsidized terms), and how best to establish sustainable support and exit (technical/financial assistance; public investment/transaction cost reduction)? The decade-long Productive Alliance Experience in Latin America[[24]](#footnote-25) highlights the need: 1) to carefully diagnose the competitiveness of the value chain (does it pay) and selectively screen the partners; 2) to start simply, build on what is there, and grow, given the inherent complexity of implementing multi-faceted programs; and 3) to involve third-party financial institutions to facilitate a sustainable exit.

**Against this background, the rice smallholder iVCD pilot project was initiated in Côte d’Ivoire, with three overarching learning objectives**. First, it is explored whether cash transfer beneficiaries could also be assisted to raise their income earning capacity when remunerative markets for the goods and services they could produce are not readily available, as is the case for many agricultural products. Particularly, the potential to *leverage cash transfers by linking the beneficiaries to markets through* an integrated intervention that also develops, or generates access to, remunerative output markets such as *agricultural iVCD*, is examined. Second, building on the insights from the literature[[25]](#footnote-26) and the Productive Alliance approach, it is explored how *third party mediated iVCD* in agriculture could be *operationalized better*. Third-party iVCD entails a myriad of choices, starting with the selection of the participants and the governance arrangements, which all affect the likelihood of success, with little rigorous evidence to guide these choices. Third, *an action learning approach to address these questions* is tested to better bridge the tension between the learning outcomes of more standard academic research, usually driven by highly researchable, rather than operationally relevant questions to enable highly accurate outputs and project dynamics driven by the imperative to disburse and demonstrate results rather than rigorous learning. Overall, the rice smallholder iVCD pilot (the “Pilot”) is one of three pilot projects the World Bank Jobs Group initiated under the Jobs Multi Donor Trust Fund to explore the potential of Jobs supporting interventions that simultaneously address labor supply and labor demand constraints[[26]](#footnote-27).

**Operational, strategic, and conceptual considerations motivate the choice of *rice in Côte d’Ivoire* for testing an agricultural iVCD approach to economic inclusion.** Operationally, the World Bank Côte d’Ivoire Productive Safety Net Project (PSNP) offered the Pilot team a practical opportunity to test an integrated jobs intervention. Specifically, the PSNP provided digital cash transfers to the poorer segments of the population in the northern half of Côte d’Ivoire and complemented it in a number of beneficiary villages with an economic inclusion package (cash+). Given the wide engagement of their targeted population in agriculture, many of them in rice, the PSNP team was open to testing iVCD as an alternative approach to the standard economic inclusion package.

With about half of rice consumption met by imports (in Côte d’Ivoire, and West Africa more broadly), urban rice demand growing rapidly, domestic rice production labor intensive and concentrated among smallholders, and rice productivity still predominantly low with proven potential of the contrary, raising smallholder labor productivity in rice production also offers good prospects for more productive and inclusive employment and income generation, on the farms, and in the chain.[[27]](#footnote-28) This aligns well with the country’s imperative to generate more good jobs as well as with the government’s national rice strategy promoting import substitution and national food sovereignty. This is the strategic backdrop for the Pilot.

The focus on iVCD in rice is also of interest conceptually for learning about iVCD more generally. As the most important calorie source in many settings, including in West Africa and Côte d’Ivoire, riceis a key staple and strategic commodity to address food security.[[28]](#footnote-29) Theory suggests, however, that staple crops may be less suitable for contract arrangements than cash crops or high value foods (fruits and vegetables, dairy, nontraditional exports).[[29]](#footnote-30) The homogeneous characteristics of staple crops leave less room for quality upgrading and value addition. This reduces buyer incentives to pay suppliers a premium for consistent high quality, while also reducing seller incentives to adhere to the contracting arrangements. The presence of many potential buyers for staple crops makes contract enforcement even more difficult. As a result, the risks of both producer opportunistic side-selling and buyer strategic contract breach are higher, making it more difficult to develop incentive compatible contracts. Limited economies of scale in procurement, storage, processing, and marketing also reduce incentives for traders and processors to invest in chain coordination. Yet, with rice increasingly purchased, urban consumers demanding and domestic wholesale and retail buyers seeking a secure, voluminous supply of good quality rice allowing for more differentiation and higher margins, rice increasingly takes on the features of a cash crop. Demonstrating proof of concept of iVCD in rice is thus of particular interest, both conceptually, as well as operationally, with important scale up potential.

**Within the iVCD pilot, three different domains of tension are explored, each time with an eye on brokering sustainability and facilitating scale up.** First, the equity orientation of the pilot (improving the livelihood of cash transfer beneficiaries) has to be traded off against efficiency and sustainability considerations. Buyers and agricultural service providers typically target larger, commercially oriented farmers to maximize volume/sales and to minimize transaction costs. Against this background, how are iVCD coalitions best formed with an eye on sustainability and scaling potential? Should they focus on large or smaller farms and firms? The presence of farmer organizations can help mitigate transaction costs. Second, the gains from market complementarity need to be balanced with the challenge of increasing operational complexity. Assistance to farmers and value chain stakeholders on different fronts is needed, though hard to materialize at once. Decision criteria to adjudicate which constraints to alleviate first and feedback mechanisms to timely adjust are needed. One such choice includes the relative focus on raising yields to increase volumes versus raising quality to fetch a higher price, or both. This quantity-quality trade-off holds across stakeholders, at farm level, within the mills (milling volumes vs efficiency), and for credit provision (loan volume versus quality). Third, should support be focused on temporary input price support (subsidization) to bring inputs within reach, help stakeholders familiarize themselves with new inputs and products, and reduce risks, or on technical assistance and reducing transaction costs, and which is more sustainable and scalable?

**A different learning approach – the three Rs of action learning (Relevance, Rigor and Rapid).** Contrary to standard operational practices, driven by the implementation and disbursement imperative, much more attention is paid in this Pilot to systematic data gathering and accommodating research considerations. This is pursued through implementation at a smaller (pilot) scale as well as close involvement of the research team in the design and implementation of the intervention. It helps increase the rigor of the findings. Contrary to standard academic research, focused on testing well-circumscribed, ex ante hypotheses or interventions, often specifically designed precisely because they can be rigorously tested and analyzed with a high degree of confidence, as in Randomized Control Trial (RCT) approaches, the Pilot takes a more hybrid approach. It combines quantitative experimental (RCT) and observational approaches (Propensity Score Matching) to examine both specific project design choices and the overall project effect, while cognizant of the operational practice and imperative to continuously learn and adjust project design and implementation modalities during implementation to maximally achieve the desired outcomes. Data informed qualitative approaches drawing on the intimate knowledge of project implementation are further pursued to shed light on the many different design issues that have to be made in supporting a value chain. As such, what is evaluated is an adjustable iVCD approach with systematic data feedback loops, rather than the outcome of a particular pre-defined intervention. It seeks to make learning more relevant and rapid, while maintaining rigor, which constitute the three defining Rs of action learning (relevant, rigorous and rapid.

**This note synthesizes the findings from the Pilot experience with regard to these three overarching questions** – the potential of agricultural iVCD to link poorer, cash transfer beneficiary farmers to markets and broker economic inclusion; the potential and modalities of third-party mediated iVCD in a staple crop (rice) with emerging cash crop characteristics; and the potential of action learning to inform agricultural project and policy design.

**The note proceeds as follows**. Section 2 lays out the key contours of the Pilot, including its data collection and analytical design. Sections 3, 4 and 5 then discuss the Pilot experience from the perspective of the three participating iVCD stakeholders: the farmers, the mill and the financing institution respectively. The sections each time briefly discuss the challenges faced by the respective stakeholder and how the Pilot’s design features attempted to address these, the Pilot’s experience in helping the stakeholders overcome these challenges, and the key lessons learned from the stakeholder’s perspectives. The sections draw on key informant consultations and quantitative analysis of the administrative and survey data collected. Section 6 reflects on the performance of the institutional and organizational arrangements that governed the interactions among the stakeholders. Section 7 concludes, pulling together the key lessons of the Pilot with an eye on sustainability and scaling of third party mediated iVCD for rice and other crops, in West Africa and beyond.

# Key contours of the Pilot

**For value chain stakeholders to organize cooperation around shared objectives, four building blocks need to be put in place.** First is the identification of the shared objectives themselves and the incentives motivating each of the stakeholders in pursuing these objectives. Second is the articulation of the shared responsibilities sufficient for each partner to understand the actions that they must undertake. Third is to put in place an agreement on a plan of action that is practical, affordable, and trackable. Fourth is to establish the means to monitor actions and progress, to inform accountability for each partner, and to inform periodic reviews of progress, adjustments, and recommitments to the shared objectives (Barrett et al. 2022).

**The belief that quality rice for urban rice markets can be competitively produced in Côte d’Ivoire’s is widely shared.** The Pilot built on the shared observation among rice supply chain stakeholders (farmers, input providers, millers, buyers, banks) and policy makers in Côte d’Ivoire, and West Africa more broadly, that the demand for higher value quality rice exists locally, especially among the urban populations, and that quality rice could be competitively produced locally and at scale, provided better coordination and investment along the chain.[[30]](#footnote-31) With this in mind, the government of Côte d’Ivoire had been investing substantially in improved seed production, to make the improved rice varieties favored by the urban populations more readily and widely available, which posed less of a challenge by the time of the Pilot. They had also invested substantially in enhancing the milling capacity of medium sized mills.

**Yet, players in the rice chain are insufficiently coordinated and capitalized** to pull the chain and bridge the time lapse between the upfront investment and payment which occurs at each node in the chain.[[31]](#footnote-32) As a result, the transaction costs among the stakeholders remain high and the chain undercapitalized, with many farmers stuck in low productive, low quality subsistence rice production, mills struggling to raise working capital to run their mills at profitable capacity, traders roaming the countryside in search for quality rice for wholesalers and urban retailers, financial institutions remaining on the sidelines, and urban consumers turning to imports to meet their needs, despite their taste preference for local rice varieties and willingness to pay a premium for it.[[32]](#footnote-33)In response, the government of Côte d’Ivoire had developed a strategy dividing up the country into 10 rice growing zones, each of them to be pulled by large private sector operators and built around 30 large mills (with a capacity of 5 tonnes per hour or more). By the start of the pilot, implementation of this new strategy had only just started. Similarly, efforts to create a rice value chain association (O*rganisation Interprofessionelle Riz* or OIA-Riz). were incipient.

**The contracting arrangements in the rice iVCD Pilot in Côte d’Ivoire were set up in light of this background, with the additional objective of including cash transfer beneficiaries.** As highlighted, in the years prior to the Pilot, much policy attention had already gone to expanding the availability of quality seed and upgrading the equipment of the medium sized mills, while the division of the country in different geographic rice areas organized around large milling factories and the identification of large lead firms to overcome the financing constraints and pull the chain in these geographies was underway. Rice pilot contracting arrangements to increase coordination among rice chain actors and improve access to inputs and finance were further experimented with by different actors in the chain, while others continued to focus on extension to increase productivity and food security, without further engagement in the chain. Given the Pilot’s equity orientation and interest in generating better jobs for the poorer segments of the population through the production of more good quality rice that could be commercialized at a higher price and higher profit margins, it focused on setting up contracting arrangements around smaller mills with micro-finance institutions that were also more proximate to its target group.

**Pilot assistance focused on reducing coordination and transaction costs and technical assistance.** Given the assumptions that 1) the domestic urban markets for quality rice were readily available and undersupplied; 2) that intensified production of quality rice could be profitable for smallholders at market prices for inputs and output provided access to good quality inputs could be assured and financed, and 3) that mills could supply the urban quality rice markets provided a reliable supply of quality paddy and sufficient working capital to buy the paddy rice, the Pilot’s focus was on reducing the cost of coordination and other transaction costs between value chain actors, including through building trust, and the provision of technical assistance to farmers and mills to increase their productivity. Consistent with government policies[[33]](#footnote-34), inputs (including credit) and output were traded at market price (no subsidization). End buyers (such as rice wholesalers or retailers) were not explicitly pulled into the Pilot arrangements, though the mills were assisted in their urban market discovery and marketing of good quality rice.

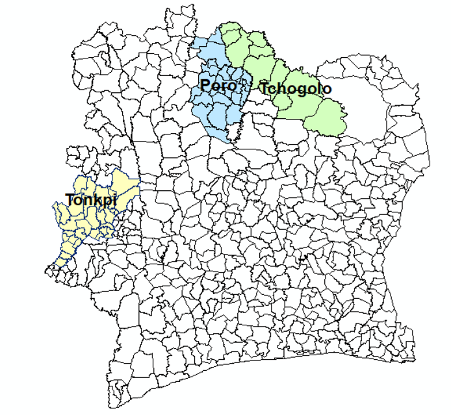
**In what follows, the key contours of the pilot, the evolution of its implementation, and the data collection and analytical design are presented**, including a brief overview of the respective roles and responsibilities, the plan of action, and oversight and monitoring arrangements. The subsequent chapters then go into greater depth into the motivations, findings and lessons from the different stakeholders’ perspectives, each time with an eye on incentive compatibility.

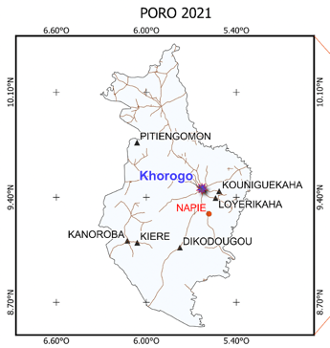
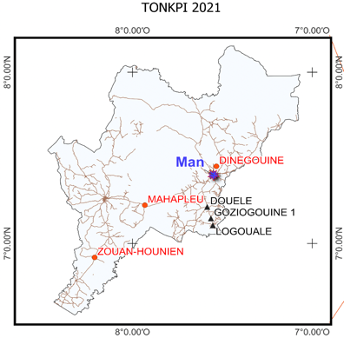
## Selection and support of stakeholders

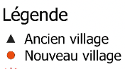
**Pilot activities focused on three regions of Côte d’Ivoire and areas up to 50 kms around the capitals in these regions**. The three regions (Tonkpi, Poro and Tchologo) were selected based on the share of cash transfer project (*Projet Filets Sociaux Productifs,* PFSP) beneficiaries already cultivating rice (Figure 1). Additional factors taken into account in the choice of focus regions and the location within these regions were the availability of an operating small-scale rice mill, the presence of a regional micro-finance institute branch, and water availability for rice production. For these reasons, the Pilot operated in villages within a 50 km radius around each region’s capital to facilitate interactions with the mill and micro-finance institutions as needed.

The three regions further differed in their socio-economic and agro-ecological features providing different contexts to test the iVCD approach. Tonkpi was the poorest region, with coffee grown in addition to food crops. Here the project operated around its capital, Man. Poro was the richest region of the three, with its capital, Korhogo, the fourth largest city of Côte d’Ivoire, greater engagement in off-farm employment, and cotton and cashew frequently grown as cash crop, and maize for food (and feed). It also counted many small scale rice mills, seeking to diversify away from milling for a fee on commission. Korhogo is well connected by road to the south of the country. As Man, it also enjoys daily flight connections to Abidjan. Finally, farmer landholdings are larger and irrigated rice cultivation more frequent around Ferke, the capital of Tchologo. Cotton and cashew are widely grown cash crops.

Figure Pilot Regions and Villages (2021)



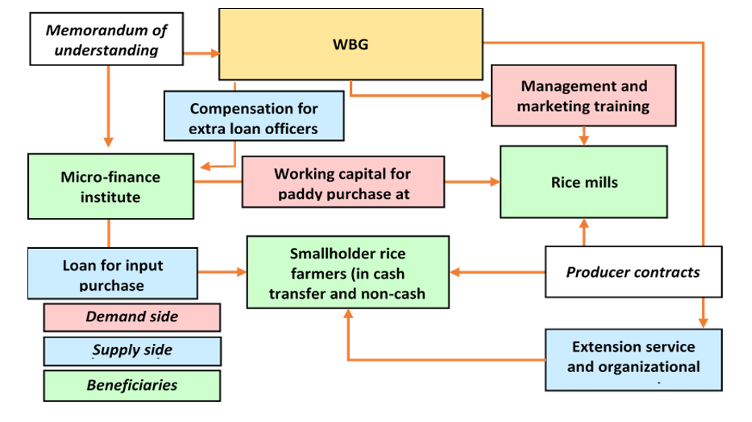




**In each of these regions, Pilot participants consisted of three main stakeholders – farmers, rice mills, and a finance institution**. Participation by farmers in selected villages was open to all with access to land suitable for rice production and some form of water control, with a focus on subsistence rice farmers with potential for producing a marketable surplus, and for policy testing purposes, a mix of farmers benefiting, and not, from a cash transfer program. One rice mill per region of approximately 2-ton paddy rice/hour milling capacity (2t/h) was selected based on an inventorying in each of the three regions of operators and their technical and commercial capacities to act as a value chain leader. A financial intermediary completed the main institutional architecture, selected based on interest, presence in the three Pilot regions, and ability to offer commercial-terms credit to farmers and mills in support of the Pilot’s activities. End buyers or input providers were not directly part of the consortium. The benefits of these additional partners were conceived not to outweigh the cost of additional complexity to within consortium coordination, as quality seeds and agro-chemicals and urban demand for quality rice were assessed to be readily available and accessible to the farmers and the mills.

**Also mobilized were one national and three local Pilot coordinators and domain specific supporting partners to reduce coordination and transaction costs and provide technical assistance**. In each of the three regions, the Pilot appointed a regional coordinator to facilitate the interaction between the different stakeholder at local level and assist with the daily monitoring and data collection as well as a national coordinator to facilitate interaction between the regions and the national stakeholder counterparts as well as the national rice office and development partners. Supporting partners consisted of contracted service providers as well as the Government’s national promotion agency for the rice value chain, ADERIZ. Broad implementation support was provided under contract with the service provider[[34]](#footnote-35) that undertook the selection of participating mills, provided these with capacity-strengthening technical assistance, backstopped the Pilot’s national and three regional coordinators, and anchored planning and review participants’ workshops. ADERIZ representatives helped guide the Pilot in the evolving context of the national strategy for rice value chain development and participated in annual Pilot workshops. Agronomic extension to the farmers was provided by a locally hired firm through the organization of field schools coupled with individual follow-up field visits. A part time credit agent was also financed by the Pilot in each of the regions to assist the financial institution to reduce the transaction costs of individual credit provision to the farmers. Figure 2 presents a schematic overview of the key stakeholders, their interactions and the key support provided through the Pilot.

Figure 2 Pilot Stakeholders and Main Interactions



**A contract formalized relations between rice farmers and a local rice mill before planting decisions and ties the different partners together**. The rice purchasing contractbetween the local rice mill or processing unit (PU) and the producers stipulated the farmgate purchase price and quality at harvest as well as the quantity to be delivered. It also formed the basis for obtaining input credit for the producers and determining the amount of working capital for the PUs after the harvest. All modern inputs and credit were provided on commercial terms. There were no direct input or credit subsidies provided by the Pilot. Instead, it focused on facilitating interaction and establishing trust between the partners, to reduce transaction costs arising from coordination and contract enforcement, which were expected to be particularly high at the beginning, as well as capacity building of the actors.

**Technical assistance aimed to strengthen one *rice mill* in each region with the intent being for the participating mill to play a catalytic role in developing the value chain**. Support to the rice PUs consisted of technical assistance regarding the technical and financial operation of a rice mill as well as quality rice marketing, as needed. In return, the mills hired at their own expense a liaison officer to maintain regular contact with the contracted farmers throughout the rice production campaign. Through the establishment of a collaborative partnership with the micro-finance institute, access to working capital for post-harvest rice purchasing by the mill was facilitated. Lack of working capital is a common problem faced by smaller PUs, resulting in underutilization of their milling capacity and investment capital. The Pilot built on this form of “purchased-paddy-transformation-for-sale” model through the development of contract farming of higher quality paddy rice permitting the PUs to obtain better margins per kg of white rice by supplying the more remunerative urban markets.

**Rice farmers were supported** **in a number of ways**: with agronomic training to ensure higher yields of better-quality rice, through facilitation of access to finance by the same microfinance institute to buy inputs (such as seeds, herbicides, and fertilizers), and access to mechanized services, as well as guaranteed access to a market at a guaranteed farm gate sales price. Technical assistance was further provided to help the producers organize themselves in commercial interest groups (CIG) around rice.

**The financial institution received support to cover the cost of a part time credit agent** in each region to reduce the transaction costs of individual credit provision to the farmers. No other technical or financial support was provided, however. There was no (partial) credit guarantee or equity participation. As such the financial institution carried the full burden of the risk of credit default (including this related to harvest failure). The microfinance institute had branches throughout Côte d’Ivoire. The poorer segments of society are at the core of their clientele. It partnered with the Pilot to expand its presence in the agricultural sector and thus extend its reach to this clientele, both to sign them up as savers and offer them access to new loan products. The program was designed with 6-month loans to the rice producers and extended loans to the processing units.

**The Pilot’s technical assistance provider and regional coordinators** assisted farmers in their formation of CIGs, their selection of Presidents, and in the clarification of functions and roles of the CIG in representing farmers in rice value chain activities undertaken through the Pilot. The aggregation of village-level CIG into region-level inter-CIG was also facilitated with the intent that the latter undertake activities aiming at input demand aggregation, procurement, and distribution. As part of this activity the technical assistance provider established procedures and documentation to facilitate understanding and transparency. In additional support to farmers, the technical assistance provider facilitated the establishment of an extension plan through which farmers were provided with support on improved techniques of rice production, harvesting, and storage.

## Implementation in Practice

### Evolving rules of engagement

**Implementation took place over three crop years beginning in 2019 and ending in 2021**. The results of each campaign were annually reviewed with participants and partners, in three regional workshops locally and at the national level, with recommendations that emerged from the workshops built into adjustments for the following crop season’s pilot activities. These reviews and workshops were enriched by work undertaken by the technical service provider, which established a range of documents and protocols for Pilot administration as well as intermediate studies on rice production economics in the Pilot regions. These underpinned adjustments in farmer targeting criteria, project implementation modalities as well as participating partner selection and interactions.

**The second campaign modifications entailed:** (1) support for intensified rainfed rice production was discontinued, as it was not profitable; (2) participating producers were required to dedicate at least 0.25 ha of land to rice production; (3) lowland rice fields of interested producers were assessed to ensure they were suitable for rice production; (4) extension services were further strengthened; (5) simplified account opening and contracting procedures were introduced to gain time at the beginning of the campaign; (6) the representatives of the presidents of the village level GICs were invited to monthly partnership meetings to increase the producers' voice and participation; and (7) the processing unit (PU) in Tonkpi was replaced with a new PU that shared the vision of the piloting team on producing high-quality white rice for the local market.

**The third round of the pilot introduced additional changes**: (1) participating producers were required to dedicate at least 0.5 ha of low-land to rice production per account[[35]](#footnote-36); (2) “blank account” opening and the mobilization of the credit agents directly in the villages were introduced to gain time and increase participation; (3) a 10% guarantee deposit was required of the producers before providing them with credits, and participating villages could only continue if at least 50% of the village participants had fully reimbursed their prior-season loan; (4) the training provided to the producers concentrated more on practical field school training and more individual follow up in the field while the theoretical part was discontinued; (5) a quality price premium was introduced in 50% of the participating villages following an RCT design; (6) all contracts in Poro were relegated to the PU of Tchologo due non-loan repayment of the Poro PU; (7) this season, the PU’s liaison agents were financed by the Pilot, to help mitigate the debt they had accumulated over the first two seasons.

### Evolution of participation and performance

**Yields and contract compliance increased substantially over the course of the project, establishing the feasibility of profitable lowland rice production, but participation also declined.** Yields more than doubled from 1,2 t/ha in 2019 to profitable levels of 2.7 t/ha on average in 2021**.**  Contract compliance greatly improved. Virtually all participating farmers fully reimbursed their credits in year 3 and the committed paddy amount was fully delivered (up from 38 percent compliance in 2019). The price quality premium experiment further showed promise as a tool to foster quality paddy rice delivery by the farmers.

**These positive results were accompanied by a dramatic decline in participation (from 541 participants in 60 villages in 2019 to 137 participants in 20 villages in 2021), and a decline of paddy sales commitments from 474 tonnes in 2019 to 124 tonnes in 2021**. The participation of cash transfer recipients also declined. This drop-off in overall participation came as a result of three factors. First, there was a tightening of the farmer selection criteria that increased the importance of participants having access to land with decent water control and exhibiting some propensity for commercial orientation.[[36]](#footnote-37) Second, the only marginal rice yield improvement for Pilot participants over the first two years was a discouragement to continue in view of the burden of credit reimbursement, or a disqualification for those who had failed to reimburse loan amounts taken. Finally, some farmers’ participation may have been motivated by “project-shopping” in the hope for subsidized or free project benefits, only to have it confirmed that the Pilot was facilitating access inputs and credit at market prices, and subsequently dropping their participation. The government’s promise of subsidized fertilizers during the second year in response to COVID and the presence of other NGOs and international aid organizations in the region, offering subsidized inputs, did not help in this regard either, though the phenomenon of “competing projects” was mainly limited to the villages around Korhogo in the Poro region, which is also very well connected with Abidjan by road and plane.

**The experience yields a number of important lessons for scaling and establishing sustainability which had not yet been established by the end of the Pilot.** While the pilot demonstrated that profitable smallholder lowland production is possible and can be brokered through assistance, further scaling is needed to make the model profitable for the mills. By the end of the pilot, the mills were still running substantial arrears on their reimbursement, with one of them in need of a full restructuring of the credit over a long period. In addition to adding villages and increasing participation within villages to increase volumes, making the model more profitable for the mills would among others also require their entry into the higher end urban white rice markets (for example through the establishment of contractual purchasing arrangements between the millers and urban wholesales or retailers). Secure access to the high end urban white rice markets is needed for the mills to valorize the purchase of the more expensive semi-lux/lux paddy andensure the higher profit margin needed to cover the additional working capital costs and the deployment of the production officer associated with thebusiness model around which the Pilot was built, i.e. “purchased-paddy-under-contract and transformation-for-sale”. Farmers need the higher paddy prices that these improved varieties fetch to cover the costs of the inputs and the credit. Self-sustainability of the different coordination arrangements between the different actors, currently supported by the Pilot, also needs to be worked out further. Both aspects—scaling and sustainability—are elaborated on in Chapters 6 and 7. Chapters 3 to 5 elaborate on each of the different results and the reasons behind them, taking the perspective of the farmer, the mills, the financial institution and the public planner respectively.

## Data and analytical design

**The Pilot implemented a data strategy to serve both activity management and impact evaluation purposes.** During the three years of the pilot implementation, a large amount of data has been collected. Activity management was supported through systematic data collection of the transactions among the participating households throughout the course of each season (i.e. the administrative data). Data for each participant were collected at planting time on a few core socio-economic characteristics of the participating farmers (gender, cash transfer beneficiary, age), the amount of land declared for contracting, the amount of paddy rice committed for delivery, the inputs (including seed variety) ordered and acquired, the amount and cost of the credit taken. These were further supplemented with the data collected at harvest time: the amount of land actually cultivated with contracted rice, the amount of paddy harvested and sold (including the timing and quality), the amount of credit reimbursed (including the timing). Farmers’ participation in the extension activities was further updated throughout the season.

**The administrative data mainly served to track the financial flows between the different partners and were analyzed to inform the stakeholders’s evaluation of each year’s campaign.** Particularly, they were used during Pilot implementation to determine the amount of credit needed (based on the land declared), to determine the remaining amount to be deposited on the farmers’ accounts after reimbursement of the credit, and to track credit reimbursement performance. The data were also analyzed each year by the national and local project coordinators to inform the evaluation of the campaign in the different workshops. The data were collected throughout the year by the regional coordinators during their field visits. Tight data quality control was performed by the national coordinator and the broader Pilot Team throughout.

**Additional household survey data were collected to evaluate the Pilot’s impact, with substantial modification in focus over the course of the three years of implementation.** At the outset, the design of sampling and variable inclusion for impact evaluation was driven by interest in measuring the respective impact of farmer participation in either a Cash Transfer (CT) program, the rice value chain development (VCD) pilot, or both. The innovative research question that drove Pilot design initially was whether there are synergetic effects by combining the VCD with the CT program. The impact evaluation’s core hypothesis was that an integrated CT and VCD approach creates synergetic effects on the income of poor rural households. Impacts were measured in terms of household income and through the different mechanisms of each component.[[37]](#footnote-38) Four treatment groups were identified to structure initial village and household participation enrollment and data gathering: 1) VCD+CT: villages that participate in the VCD intervention and benefit from CTs; 2) VCD: villages that participate in the VCD intervention only; 3) CT: villages that benefit from CTs only; 4) Control: villages that do not participate in any of these two interventions.[[38]](#footnote-39)

Following this design, baseline data were conducted at Pilot start up in 2019. In the three project regions, (Pilot participating and non-participating) households in the 52 Pilot villages were surveyed, with 25 of the Pilot villages (randomly selected) also beneficiary of cash transfers through the CT project. Addditional data collection was done in purposively selected proximate villages that either only benefited from cash transfers or did not benefit from either cash transfer or value chain support (drawn from a 4th region to avoid contamination through spill over effects). The baseline data collection took place during the summer of 2019 with the end-line data collection was planned for the summer of 2021.

**Given the large drop out and recruitment of many new villages and participants in the second year, a new baseline was conducted altogether in 2020, focused on the partipating villages only**. This followed the shift in focus to demonstrating that profitability of lowland rice production could be brokered and the associated shift towards a more commercially oriented selection of villages and participants (away from a deliberate RCT driven focus on testing the benefits of VCD for cash transfer beneficiaries). Baseline (2020) and endline (2021) household surveys were conducted in the participating villages. The surveys collect data about household characteristics and food security as well as detailed data on agricultural practices, especially on labor use and concerning rice production. A difference-in-difference approach with propensity score matching (DID-PSM) for the Pilot’s impact evaluation was envisioned, comparing the findings after and before the Pilot between Pilot participants and non-participants within the Pilot partipating villages, controlling for selection bias by matching participants and non-participants based on observable characteristics.

**Given further drop out and the addition of new villages in the third year, a within village comparison of the outcomes among Pilot particicpants and non-participants in 2023 was eventually pursued to examine the Pilot’s impact, combined with instrumental variable techniques and great attention to measurement bias.** Following further disappointing results in some villages linked to input delivery problems in year 2 and subsequent tightening of the participation criteria, the number of participating villages in 2021 dropped to 20 (from 60 in 2021) of which 5 were new villages, and the number of participants dropped from 458 to 137 (of which 61 were repeaters from 2020). Baseline data were further lacking for the 5 new villages, reducing the number of participants for which a panel could be constructed to about 100. Given additional differences in output and area measurement at baseline between participants and non participants (weighted harvest and GPS measured plot size for participants, self reported harvest and cultivated rice area for the nonparticipants) and limited statistical power to conduct the DID, the evaluation focused on the within village comparison between participants and nonparticipants instead to evaluate the impact of the Pilot, controlling for selection bias through instrumental variable techniques.

**Great care was further taken in the measurement of the different outcome variables of interest.** Particularly, the 2021 household survey was completed in 3 waves to better capture seasonal adjustments in agricultural practices as new information comes in and to better capture labor inputs in the different activities.[[39]](#footnote-40). All rice harvest was weighted and the plots were GPS measured. Each time all participants (census) and a random selection of non-participants were covered in the participating villages. To the extent possible, the same households covered in 2020 were also covered in 2021 to construct a panel, though given the presence of new adopters in 2020 villages (not surveyed in 2020) as well as the addition of new villages in 2021, this was not fully attained. In 2021, the survey covers 456 households in the Pilot participating villages in the three regions of study, of which 131 participated in the Pilot. In dynamic terms, 269 never participated, 47 dropped out, 57 participated for the first time and 74 were repeaters (participating in 2020 and 2021).

# The Economics of Rice Contract Farming

**The job generating potential and smallholder income increase from rice import substitution appears substantial.** The jobs promise for Côte d’Ivoire from rice import substitution through more efficient rice production is substantial.[[40]](#footnote-41) Simulations indicate that by reallocating 20 percent of current rice land towards more intensified rice production systems and moving towards the production frontier within each production systems, Côte d’Ivoire’s rice import dependency[[41]](#footnote-42) could reduce by more than half (from 58 to 28 percent). The number of full-time equivalent (FTE) jobs (including those in the rice value chain) would increase by 27 percent and total net earnings by 200 percent. The lion’s share of the earnings increase would go to smallholder rice growers, who would see the return to family labor triple. The simulations support the notion of broad-based income growth through more efficient rice production, at least in an accounting sense.[[42]](#footnote-43)

**For inclusive rice value chain development to succeed, intensified smallholder rice production must be profitable and competitive.** The pilot tests the potential of inclusive rice value chain development and rice contract farming to broker such a shift. Critically, for inclusive rice value chain development to succeed, each stakeholder must gain. This section queries the profitability and competitiveness of smallholder intensified rice production. It further examines the promise and challenge of iVCD to promote and sustain intensified smallholder rice production that is profitable and competitive, as revealed through the pilot. The focus is on lowland rice production. Particular attention goes to cash transfer receiving lowland rice growers and their potential for rising their incomes through rice contract farming.

**The section proceeds as follows.** It begins by profiling smallholder rice growers in the pilot areas, including their current returns to rice growing and market orientation as well as the constraints identified to raising their incomes from rice production. It subsequently summarizes the actions taken by the pilot to mitigate these constraints and reviews the implementation experience. Finally, the key take-aways for sustainability and scaling are listed.

## Lowland rice growers in the pilot area

**Lowland rice production in the pilot areas is practiced with varying intensification levels across regions and production systems.**The baseline data collected in 2019, the first year of the pilot, reflects rice cultivaton practices and farmer performance in 2018, the year before the pilot. It helps paint a good picture of the state of smallholder lowland rice growing in the pilot area (Tables 1 and 2).

**A small, but nonnegligible group of farmers across the three pilot areas (8.3 percent) still follows *traditional rice cultivation* methods, focused on auto-consumption at returns to family labor just above the agricultural wage rate.** Traditional rice farmers prepare the land manually and do not use any modern inputs (improved seeds, inorganic fertilizer, nor pesticides). In 2018, they harvested *on average* 1036 kg/ha, earned 54,200 FCFA per ha (net), or 1,440 FCFA (net) per family person day worked in rice[[43]](#footnote-44). The latter just exceeds the local agricultural wage rate (~1,200 FCFA/day), suggesting traditional rice growing is competitive, even though not gainful. Traditional rice farmers have smaller farms (2.95 ha vs 4.85 ha on average), mainly produce for autoconsumption (only 8 percent of the rice harvested was sold), and devote the rest of the land to cash crops (mainly cacao and coffee). Practice of the traditional rice cultivation method is confined to the villages in the Tonkpi region.

**Traditional rice farmers are poorer, are more risk averse, and have little access to credit or extension, suggesting room for improvement.** They have fewer land assets and livestock. They also do not have animal traction or tractor services in their villages. Yet, they are also more inclined to seek information, while having been neglected by extension services (some reported not to have seen an extension agent for the past 30 years). It suggests substantial room for improvement in agronomic practices, even though the available land appears limited (rendering them less appealing from the miller’s or credit union’s perspective). Surprisingly, traditional rice farmers report hiring substantial amounts of labor for rice production (86 person days per ha), more than in any of the other more intensified production packages discussed below.

Table Farmer profile of different rice intensification packages

| Variables | All | Traditional Package | Semi-Traditional Package | Semi-Modern Package | Modern Package | P-value |
| --- | --- | --- | --- | --- | --- | --- |
| **Demographics** |  |  |  |  |  |  |
| Age household head (years) | 46.63 | 47.50 | 46.03 | 47.03 | 45.63 | 0.944 |
| Sex household head (1=male) | 0.92 | 0.88 | 0.93 | 0.91 | 1.00 | 0.070 |
| Education household head (grade years completed) | 2.59 | 5.58 | 3.03 | 1.49 | 2.89 | <0.001 |
| Household size | 5.98 | 4.55 | 5.87 | 6.37 | 6.32 | <0.001 |
| Dependency ratio | 0.49 | 0.45 | 0.50 | 0.49 | 0.53 | 0.054 |
| Members aged 0-14 | 2.90 | 1.95 | 2.87 | 3.08 | 3.53 | <0.001 |
| Members aged 15-35 | 1.52 | 1.26 | 1.46 | 1.67 | 1.05 | 0.030 |
| Members aged 36-65 | 1.33 | 1.05 | 1.33 | 1.38 | 1.66 | 0.001 |
| Members aged > 65 | 0.23 | 0.29 | 0.22 | 0.24 | 0.08 | 0.215 |
| **Socio-economic and attitude** |  |  |  |  |  |  |
| Off-farm activity (1=Yes) | 0.07 | 0.04 | 0.10 | 0.06 | 0.11 | 0.072 |
| Wealth index (PCA score) | 0.22 | -1.00 | 0.32 | 0.38 | 0.56 | <0.001 |
| Access to credit (1=Yes) | 0.32 | 0.03 | 0.37 | 0.35 | 0.29 | <0.001 |
| Information seeking attitudes (PCA score) | -0.03 | 0.50 | -0.11 | -0.16 | 1.01 | 0.360 |
| Risk aversion (PCA score) | -0.09 | 1.11 | -0.33 | -0.17 | -0.04 | <0.001 |
| **Farm management** |  |  |  |  |  |  |
| Total land owned (ha) | 4.83 | 2.92 | 4.65 | 5.35 | 5.84 | 0.353 |
| Total livestock units | 1.67 | 0.04 | 1.60 | 2.03 | 2.76 | 0.010 |
| Land cultivated with rice (ha) | 0.98 | 0.59 | 0.92 | 1.10 | 1.34 | <0.001 |
| Share of cash crop area (%) | 33.35 | 54.83 | 29.63 | 33.01 | 16.70 | <0.001 |
| Experience in rice farming (years) | 17.81 | 20.19 | 16.99 | 17.81 | 20.05 | 0.750 |
| Training on rice production (1=Yes) | 0.36 | 0.17 | 0.44 | 0.32 | 0.58 | <0.001 |
| Number of training participations | 1.17 | 0.53 | 1.43 | 1.07 | 1.53 | 0.319 |
| Plot visited by extension agent (1=Yes) | 0.45 | 0.17 | 0.47 | 0.46 | 0.74 | <0.001 |
| Number of plot visits by extension agent | 1.16 | 0.39 | 1.38 | 1.12 | 1.45 | 0.325 |
| Plot management (1=solely;0=joint)) | 0.81 | 0.81 | 0.81 | 0.82 | 0.68 | 0.241 |
| Distance to plot (walking minutes) | 49.7 | 46.7 | 54.7 | 46.2 | 48.6 | 0.121 |
| **Socio-economic and agro-ecological environment** |  |  |  |  |  |  |
| Population density | 287 | 386 | 279 | 274 | 256 | 0.357 |
| Village labor availability (1=yes) | 0.6 | 0.50 | 0.62 | 0.60 | 0.63 | 0.164 |
| Distance to closest city (km) | 25.60 | 22.02 | 22.47 | 29.96 | 15.45 | <0.001 |
| Rainfall (historical average(mm) | 934 | 1219 | 931 | 877 | 876 | <0.001 |
| Rice growing households (%) | 78.75 | 82.25 | 76.38 | 79.74 | 82.24 | 0.011 |
| **Instruments** |  |  |  |  |  |  |
| Tractor service (1=Yes) | 0.79 | 0.02 | 0.80 | 0.96 | 0.97 | <0.001 |
| Draught animal service (1=Yes) | 0.23 | 0.02 | 0.30 | 0.22 | 0.32 | <0.001 |
| Households using chemical inputs (%) | 0.80 | 0.16 | 0.84 | 0.89 | 0.99 | <0.001 |
| Number of agricultural cooperatives | 1.78 | 1.18 | 1.62 | 2.05 | 1.84 | <0.001 |
| **Regions (%)** |  |  |  |  |  | <0.001 |
| Poro | 0.37 | 0.00 | 0.29 | 0.54 | 0.05 |  |
| Tchologo | 0.47 | 0.02 | 0.55 | 0.46 | 0.95 |  |
| Tonkpi | 0.16 | 0.98 | 0.15 | 0.00 | 0.00 |  |
| **Observations** | 1039 | 109 | 415 | 477 | 38 |  |

Notes: Mean values of key variables are shown. P-values of continuous variables are obtained by one-way Anova test for equality of mean values; P-values of binary variables are obtained by Pearson’s *χ*2-tests for equal proportions. The larger the value on the information seeking and risk attitude indices is, the more information seeking and risk averse the household head is. Traditional package: manual land preparation and no modern input use; Semi-traditional package: manual land preparation and use of both pesticides and inorganic fertilizer; Semi-modern package: use of animal traction for land preparation and use of both pesticides and inorganic fertilizer; Modern package: use of tractor services and use of both pesticides and inorganic fertilizer.

Source: Aihounton and Christiaensen, 2023

Table Labor allocation, input use, and farm performance along different intensification packages

| Variables | All | Traditional Package | Semi-Traditional Package | Semi-Modern Package | Modern Package | P-value |
| --- | --- | --- | --- | --- | --- | --- |
| **Labor allocation** (person-day/ha) |  |  |  |  |  |  |
| Total household labor (Men) | 29.31 | 70.78 | 29.75 | 20.98 | 10.11 | <0.001 |
| Total household labor (Women) | 15.01 | 35.51 | 13.32 | 12.54 | 5.82 | <0.001 |
| Total household labor (Children) | 5.32 | 3.09 | 5.54 | 5.87 | 2.39 | 0.315 |
| Total household labor (person-day/ha) | 49.6 | 109.48 | 48.6 | 39.4 | 18.3 | <0.001 |
| Total hired labor (person-day/ha) | 48.2 | 86.0 | 61.1 | 29.4 | 35.6 | <0.001 |
| Total labor (household + hired) (person-day/ha) | 97.9 | 195.4 | 109.7 | 68.8 | 53.9 | <0.001 |
| Total hired labor cost (1000 FCFA/ha) | 56.3 | 89.7 | 64.3 | 40.2 | 75.8 | <0.001 |
| Agricultural daily wage rate across villages (FCFA/day) | 1,166 | 1,153 | 1,198 | 1,194 | 1,263 | <0.013 |
| **Other inputs** |  |  |  |  |  |  |
| Use of improved seed (1=Yes) | 0.25 | 00 | 0.32 | 0.23 | 0.53 | <0.001 |
| Total quantity of seed (Kg/ha) | 86.0 | 77.1 | 89.1 | 85.7 | 80.6 | 0.811 |
| Quantity of Urea (Kg/ha) | 62.9 | 0.00 | 75.4 | 66.9 | 57.4 | <0.001 |
| Quantity of NPK (Kg/ha) | 113.1 | 0.00 | 127.6 | 122.7 | 157.0 | <0.001 |
| Total quantity of fertilizers (Kg/ha) | 176.0 | 0.00 | 203.0 | 189.6 | 214.4 | <0.001 |
| Use of fungicide (1=Yes) | 0.31 | 0.00 | 0.36 | 0.32 | 0.58 | <0.001 |
| Use of herbicide (1=Yes) | 0.90 | 0.00 | 1.00 | 1.00 | 1.00 | <0.001 |
| Total quantity of herbicides (L/ha) | 8.92 | 0.00 | 10.25 | 9.77 | 9.20 | <0.001 |
| Production cost (1000 FCFA/ha) | 142.22 | 101.27 | 161.49 | 132.30 | 173.79 | 0.251 |
| **Productivity and profitability** | | | | | | |
| Yield (kg/ha) | 1937.7 | 1036.7 | 2081.8 | 1993.7 | 2246.6 | <0.001 |
| labor productivity (kg/person-day) | 30.3 | 6.5 | 26.8 | 37.1 | 51.9 | <0.001 |
| Profit per ha (1000 FCFA/ha) | 148.4 | 54.2 | 150.8 | 166.8 | 163.2 | <0.001 |
| Economic profit per ha (1000 FCFA/ha) | 99.71 | -52.88 | 102.69 | 128.46 | 143.96 | <0.001 |
| Return to family labor (FCFA/person-day) | 7142 | 1440 | 8060 | 7065 | 14463 | <0.001 |
| Return to total labor (FCFA/person-day) | 3146 | 899 | 2766 | 3810 | 5413 | <0.001 |
| **Farm specialization, market orientation**  **and food security** | | | | | | |
| Rice plot size (ha) | 0.98 | 0.59 | 0.92 | 1.10 | 1.34 | <0.001 |
| Share of land cultivated with rice (%) | 25.96 | 29.52 | 26.98 | 24.12 | 27.64 | 0.021 |
| Rice production per ha (kg/per capita) | 356 | 162 | 361 | 380 | 570 | <0.001 |
| Share of rice commercialized (%) | 26.01 | 7.56 | 29.84 | 24.95 | 50.50 | <0.001 |
| Rice sold per capita (Kg/capita) | 137.40 | 24.67 | 151.20 | 127.48 | 434.52 | <0.001 |
| Food insecurity (HFIES) | 4.28 | 7.24 | 4.08 | 3.93 | 2.42 | <0.001 |
| Dietary diversity score (24 h) | 6.57 | 6.45 | 6.67 | 6.49 | 6.84 | 0.381 |
| Dietary diversity score (7 days) | 8.23 | 8.64 | 8.29 | 8.06 | 8.50 | 0.018 |
| Observation | 1039 | 109 | 415 | 477 | 38 |  |

Notes: Mean values are shown. P-values of continuous variables are obtained by a one-way Anova test for equality of mean values and P-values of binary variables are obtained by Pearson’s *χ*2-tests for equal proportions. All labor related variables are expressed in person-day/ha. Implicit wage is obtained as ratio of total expenses on hired labor divided by average person-day hired. Traditional package: manual land preparation and no modern input use; Semi-traditional package: manual land preparation and use of both pesticides and inorganic fertilizer; Semi-modern package: use of animal traction for land preparation and use of both pesticides and inorganic fertilizer; Modern package: use of tractor services and use of both pesticides and inorganic fertilizer.

Source: Aihounton and Christiaensen, 2023

**The vast majority of farmers in the study area are *semi-traditional* (31,5 percent) or *semi-modern* (36.6 percent), with yields twice as high, and returns to labor even higher.**  Farmers who prepare the land manually and use both inorganic fertilizer and pesticides are classified as semi-traditional; those who use animal traction to prepare the land, instead of only labor, in addition to using both inorganic fertilizer *and* pesticides, are categorized as semi-modern. When pesticides are used, it mainly concerns herbicides, both to help clear the land and reduce weed pressures during crop development. Semi-traditional and semi-modern farmers report higher yields (~2,000 kg/ha on average, between 150,000 and 166,000 FCFA profit per ha (net) and between 7,000 and 8,000 FCFA per family person day reported work in rice, suggesting that more intensified rice production is competitive with ag wage labor and substantially more profitable than the traditional method, though the numbers reported here do not account for unobserved factors (see further below). They commercialize a larger share of their production (25-30 percent).

**Farmers adopting the semi-traditional and semi-modern methods are richer and less risk averse, have better, but still limited access to credit, and hold potential for improvement.** About one third reports having access to credit. They use about 200kg of fertilizer per ha. Thirty to forty percent report having received training in rice farming. At 23-32 percent, improved seed use[[44]](#footnote-45) remains limited. Consistent with their larger farm size (2.9 vs 4.6-5.3 ha), they are situated in less densely populated areas than the traditional farmers. The descriptive results suggest that some intensification is happening; they also point to room for further improvement, including through the adoption of improved seeds and better agronomic practices. Animal traction is about equally practiced in both Poro (54 percent of semi-modern farmers) and Tchologo (46 percent of semi-modern farmers).

**Tractor use increases the labor returns from intensification further, but remains rare in the study area.** Only 3 percent of farmers use tractor services for land preparation together with pesticides and inorganic fertilizers. They are dubbed “modern” farmers, representing the most intensified lowland rice farmers at the outset of the pilot. Modern farmers are also more likely to use improved seeds (53 percent). They record on average the highest returns to family labor (14,460 FCFA net per family person-day), mainly due to substantial labor savings. The reported yields are only 10 percent higher (2,250 kg/ha), while the net returns per ha are similar as under the intermediate packages. They have slightly larger farms than the semi-traditional and semi-modern farmers (5.8 vs 4.6-5.3 ha) and they are the richest among all farmers, but don’t have more access to credit than the semi-intensified farmers. They also have better market access (15.5 vs 22-30 km from the nearest city) and commercialize a larger share of their rice harvest (50 percent sold), making them particularly attractive for the mills and the financial intermediary. The descriptive results highlight the substantial returns to mechanization (at least in terms of labor productivity), in addition to the returns to modern inputs.

**Multivariate econometric analysis confirms that rice intensification can be profitable, even though profitability is not automatic.** The descriptive performance results reported in Table 2 do not account for farm or farmer heterogeneity such as soil fertility, improved seed use, agronomic knowledge, market orientation for rice, opportunity costs on and off the farm (other crops, livestock, nonagricultural employment), which may bias the returns to intensification upward. Multivariate econometric analysis, including the use of instrumental variables to mitigate against such bias in estimating the effect of rice intensification on farm performance (yields and net returns to land and family labor) confirms that intensification can be profitable, especially when combined with animal traction or tractor use for land preparation, while also stimulating commercialization (Table 3).[[45]](#footnote-46)

**The estimates suggest an increase in yields compared to the traditional package of 720, 850 and 1380 kg per ha, for the semi-traditional, the semi-modern and the modern package respectively**. These yield increases are especially important from the mill’s perspective, holding promise to acquire more rice following intensification, especially when combined with mechanization (animal traction and/or tractor services). This is confirmed when looking at the share of rice sold, which increases by 29, 12 and 42 percentage points respectively across the intensification packages, with the mechanized packages also increasing the area of land cultivated with rice (by 0.37-0.45 ha respectively).

**From the farmers’ perspective, it is especially the (net) return to family labor that matters, which increases with intensification.** The multivariate analysis confirms that labor productivity also increases, by 5.1, 22.8 and 32.6 kg per person day for the semi-traditional, the semi-modern and the modern package respectively. When taking sale prices and expenses into account, the return to family labor only increases for the packages using animal traction (by 3,900 FCFA/person day) or tractor services (by 7,200 FCFA/person-day), underscoring the importance of access to mechanization. Clear returns to family labor from lowland rice production are crucial as lowland rice cultivation is only sustainable and scalable beyond subsistence production if intensification is profitable and competitive with other crops and off-farm activities, and if income fluctuations due to production and price risks can be managed.

**A number of entry points to increase the returns to family labor from lowland rice production and reduce the risks emerge.** Analysis of the baseline data shows that the returns to family labor can be increased and the risks reduced both by shifting farmers across production packages (intensification) as well as by moving them to the production frontier within their package (there is substantial variation around the average performance in each package). Practical entry points that emerged from the multivariate analysis and multiple field consultations with experts and farmer groups include the greater use of improved seeds, better agronomic practices underscoring the role of extension, access to credit and risk management (there is great variation in performance within each category), intensification including through mechanization, especially access to rental animal traction and tractor services. Labor shortages at critical junctures during the agricultural season were indeed a frequently reported challenge throughout the pilot, including for female farmers. Rice cultivation was also more intensified in villages with more farm organizations, underscoring the importance of institutional support.[[46]](#footnote-47)

**The diversity in intensification and farming practices across the three pilot areas further underscores the need for a differentiated approach.** Particularly, compared to rice farming in the pilot areas in the Poro and Tchologo region, rice farming in the Tonkpi pilot areas is practiced on much smaller farms, less intensified, and much less commercialized. Not only are all traditional rice farmers concentrated in Tonkpi, only about 15 percent of the semi-traditional farmers are in Tonkpi, and none of the semi-modern farmers. Some farmers (14 percent of the sample) also only use pesticides (and no inorganic fertilizer); 90 percent of them are in Tonkpi.[[47]](#footnote-48) Put differently, rice cultivation in Tonkpi is overall much less intensified, providing a different starting point from the pilot areas in the Poro and Tchologo region. It is also the reason why the region was selected under the pilot, i.e. to test whether rice contract farming can also be promoted in a more challenging, less developed environment. Farmers in the Tchologo region further have somewhat larger farms than those in the study areas around Korhogo in the Poro region. With Korhogo being one of the larger secondary cities in Côte d’Ivoire, market access and off-farm employment activities are also more developed.

Table 3 Effects of rice intensification on farm performance and market orientation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Yield  (kg/ha) | Profit per ha  (1000 FCFA/ha) | Economic Profit per ha (1000 FCFA/ha) | Labor Productivity (kg/ person-day) | Return to family labor (1000 FCFA/ person-day) | | Share of Rice sold (%) | |
| Semi-traditional package | 719.79\*\*\*  (192.69) | -8.12  (47.74) | 6.02  (41.01) | 5.08\*  (2.83) | 0.13  (1.89) | 29.81\*\*\*  (5.03) | |
| Semi-modern package | 849.72\*\*\*  (206.35) | 74.40\*\*  (37.27) | 132.95\*\*\*  (30.01) | 22.79\*\*\*  (3.45) | 3.90\*  (1.99) | 12.17\*\*\*  (3.89) | |
|  |
| Modern package | 1,378.28\*\*\*  (253.55) | 51.81  (67.91) | 88.82\*  (47.64) | 32.56\*\*\*  (6.69) | 7.20\*\*  (3.09) | 42.14\*\*\*  (4.80) | |
|  |
| Control variables | YES | YES | YES | YES | YES | YES | |

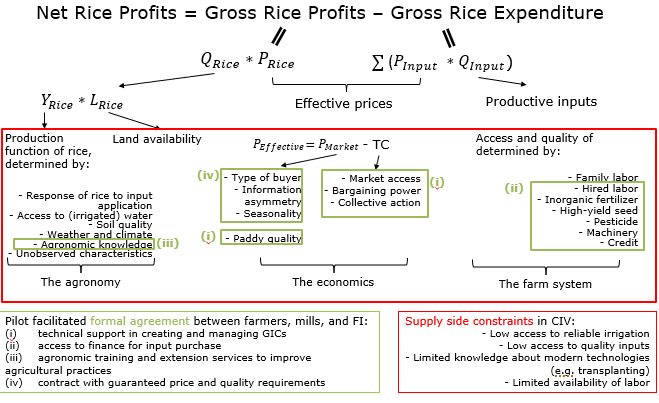
Note: Control variables include age of the household head, years of completed education grades, household size, dependency ratio, plot management type (1=Individual), experience in rice production, number of training participations, plot visited by extension agent (1=Yes), off-farm activity (1=Yes), access to credit (1=Yes), attitudes towards information, risk aversion, ln(total land owned), wealth index, ln(population density), ln(distance to plot), ln(distance to nearest city), share of cash crops area (%), proportion of rice growing households and ln(rainfall average). Yield is the rice output per hectare of rice land (kg/ha); profit refers to the total net returns of rice output per hectare of rice land; economic profit refers to the net return to land, including the opportunity costs of family labor; labor productivity indicates rice output (kg) per person-day, return to family labor captures the net return per person-day of family labor and return to total labor captures the net return per person-day of total labor (hired and family). Clustered robust standard errors at village level in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Aihounton and Christiaensen 2023.

## Pilot interventions to support farmers

**Rice farming is inherently risky and to be profitable many factors have to come together on time with limited margin of error.** Figure 3 provides a schematic view of the farm economics of rice, i.e. the different factors that have to come together for lowland rice production to be profitable and competitive with other activities for the farmer, and the areas where the pilot project intervened to help farmers do so. Furthermore, a risk margin has to be built in to overcome years with low or even negative returns following the materialization of market/economic, agronomic/biological, weather or health related risks.

Figure The farm economics of rice



Legend: Q=quantity, P=price, Y=yield, L=land

**Intensified lowland rice production is simulated to be profitable at yields of 2.5 to 3 tonnes per ha.** Based on the actual market output and input farm gate prices for quality paddy of improved rice varieties and quality modern inputs (improved seeds, pesticides and inorganic fertilizer), farm accounting simulations suggested that rice paddy yields needed to reach 2.5 to 3 tonnes/ha for intensified lowland rice farming to be profitable and competitive (i.e. yielding at least 100,000 FCFA/ha net or about 2,000 FCFA/person-day, i.e., at least 50 percent over the agricultural daily wage rate of ~1,200 FCFA/person day). Putting the numbers in perspective, yields of 2.5 to 3 tonnes/ha entail a 25 to 50 percent increase over the average yields reported by the intensifying farmers in the baseline data (Table 2). The target was considered well within reach by the different value chain stakeholders through a focus on more and better-quality rice production, i.e. increasing both volume (Qrice) and price (Pq), while keeping costs (Qinputs\*Pinputs) within bounds. It would require shifting the production frontier through an intensification of rice production (i.e. moving along the production packages discussed above) as well as moving closer to the production frontier within each of the more intensified production package through improved application of the package (i.e. moving to the upper tier of the yield distribution within each package). Production of semi-lux rice varieties which are preferred by urban consumers and more responsive to intensified production practices would help fetch a better price (compared to the currently grown local varieites) as would paying attention to better harvest and post-harvest practices to increase the quality of the paddy rice.

**To broker these returns while mitigating risks and fostering sustainability and scalability the pilot provided simultaneous support to farmers on multiple fronts through a contractual arrangement and technical assistance on agronomics (output and quality) and group formation.** Particularly, commercial farm gate quality paddy rice and input prices (including the cost of credit) were negotiated by the project at the beginning of the season with the mills, the finance institution and the input providers respectively and fixed into a contractual arrangement between the mill and the farmers. It further stipulated the paddy quantity and quality to deliver (immediately post harvest) as well as the payment conditions. The contract served as basis to obtain credit from the financial institution to finance the cost of the agreed input package (improved seeds, herbicides, fertilizer, and basic farm equipment (sprayer) as well as access to hired labor and, in principle, mechanization (e.g. for land preparation and threshing). Importantly, the contract arrangement was not contingent on the uptake of credit.

Second, in addition to increasing yields by improving access to modern inputs, farmer field schools operative throughout the rice season were set up in each village to improve input use and agronomic practices. To foster quality rice production, harvesting and post-harvest handling, a randomized control trial experiment was pursued in the last season of the pilot providing a 10 percent quality price premium in half of the participating villages.

Finally, to reduce transaction costs for the value chain partners (mills, financial agent) and help farmers over time negotiate better input and output prices, technical assistance was provided to help farmers organize themselves in non-commercial groupings around rice. Given the largely subsistence focus, organization around rice was absent In the pilot setting, a significant hurdle, substantially increasing transaction costs at the village level.

**The contract and the particular support design features adopted served several purposes.** First, for the contracting approach to be sustainable, it must be commercially viable for each stakeholder (including the farmers). For this reason and to incentivize farmers, no subsidization of inputs or credit was provided, i.e. all prices were commercially negotiated market prices by the project stakeholders.[[48]](#footnote-49) Second, input purchases and output sales were grouped in each pilot region to increase bargaining power and negotiate price discounts and mark ups respectively. It further sought to ensure the quality of the inputs[[49]](#footnote-50) as well as their timely delivery (and purchase). Third, higher output prices were secured through a focus on improved rice varieties[[50]](#footnote-51) and quality which could fetch a higher price in the urban markets. Fourth, by fixing prices and rice outlets at the beginning of the season, price and market risks were reduced. Fifth, to mitigate the risk of contract breach, increase trust and reduce transaction costs between stakeholders, a local project coordinator was deployed in each of the three project sites to help coordinate transactions and to anticipate, signal and remedy emerging disputes across stakeholders. They also facilitated access to machinery services (ploughing, but especially threshing), though their availability was limited.[[51]](#footnote-52) Finally, farmers were taught how the existing lowland infrastructure could be managed better, though no additional irrigation infrastructure was developed, given lack of funds. As a result, weather risk remained fundamentally unchanged, which motivated the focus on lowland rice, to ensure some minimal retention of soil humidity.

**Continuous learning, feedback loops, and pilot design adjustment were integral to pilot implementation.** To enable and inform course correction throughout the project detailed administrative and annual household surveys were conducted and feedback sessions with all stakeholders organized at the end of each agricultural season, in each of the pilot areas as well as nationally. Given the original focus on exploring the potential of linking cash transfer beneficiaries to urban rice markets, the pilot started by offering the program to 20 randomly selected lowland rice growing villages in each of the three pilot areas (60 in total), of which 10 cash transfer beneficiary villages and 10 non-cash transfer beneficieries. A standard protocol was followed to introduce the program and sign up interested farmers. They were subsequently requested to visit the financial institution in the nearby town to obtain and sign their loan agreement, commensurate with the value of the recommended amount of inputs needed for the amount of land (with a minimum of 0.25 ha) they had committed to allocate to intensified rice production under the contract. The pilot ran for three seasons with the selection criteria of villages and farmers as well as the contracting details and implementation arrangements evolving based on the experience of the previous season.

## Pilot rice contract farmers in action

***A hobbly journey with adaptive learning key***

**Attaining profitable lowland rice production is not automatic.** During the first two years of pilot implementation, average yields were only about half the purported 2.5-3t/ha (Table 4). It caused insufficient rice procurement for the mills (Chapter 4) and financial loss following farmer credit default for the financial institution (Chapter 5). Stakeholder workshops, also informed by analysis of the administrative and survey data collected throughout project implementation, identified a host of implementation related challenges that helped explain the lower than expected results. These included late delivery of inputs, linked to delayed credit approvision (year 1), delayed and poor input quality delivery following a last minute Covid related switch in input providers by the financial institution (year 2)[[52]](#footnote-53), insufficient extension leading to inappropriate rice field selections and insufficient agronomic practices (year 1), limited access to machinery services for threshing (and land preparation) resulting in delayed harvesting and quality loss, as well as generally insufficient farmer attention to rice cultivation and inadequate adherence to the agronomic guidelines given continuing rice subsistence orientation, slow internalization of the commercial nature of the transactions, as well as competition for attention with other crops or activities.

**Systematic learning, adapting, and giving the process time proves key.** The challenging requirements of coordinated and timely action in contract farming arrangements and incentivizing stakeholders to do so in less developed context with more limited capacity was painfully demonstrated during the first two years. Yet, a growing number of farmers attained profitable yield levels[[53]](#footnote-54) during the second year, suggesting that intensified rice production could be profitable. Stakeholders also agreed that many of the implementation challenges could in principle be addressed by finetuning the approach. Against this background, the project continued a third year with a focus on establishing the profitability of intensified smallholder lowland rice production. In addition to streamlining credit provision procedures and shifting the responsibility for input acquisition to the project and farmer groupings as well as customizing extension services further, village and participant selection criteria were also tightened (including a minimum requirement of 0.5 ha allocation to rice cultivation to be eligible for participation, fully completed loan reimbursement for repeat farmers, and a cash down payment worth 10 percent of the value of the new credit.

Table 4 Pilot participation and yields: 2019-2021

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Pilot participation* | | 2019 | 2020 | 2021 |
| Number of participating villages  *(2020‘s participants / 2019’s)* | | 52 | 60  *(15)* | 20  *(14/4)* |
| Number of cash tranfer eligible villages  *(2020’s / 2019’s)* | | 25 | 26  *(15)* | 3  *(3/2)* |
| Numbers of participating producers  *(2020‘s / 2019’s)* | | 541 | 458  *(88)* | 137  *(61/11)* |
| Number of cash transfer receiving participants  *(2020‘s / 2019’s)* | | 239 | 131  *(47)* | 13  *(8/1)* |
| Number of female participants | |  | 70 | 22 |
| (2020’s/2019/s) | |  | (6) | (2/0) |
| *Paddy rice output* |  | |  |  |
| Amount of paddy rice harvested (tonnes) | 277,7 | | 343,0 | 279,2 |
| Amount of paddy rice sold (tonnes) | 201,7 | | 182,7 | 124,2 |
| Average yield (kg/ha) including zeros | 1 213 | | 1 370 | 2 696 |
| Average yield (kg/ha) excluding zeros | 1 353 | | 1 572 | 2 778 |

Source: Barzola and Christiaensen, 2022

***Rice contracting can enhance profitable rice farming through intensification***

**More selective participation; better profitability and contract performance.** Application of the operational insights from the first two years led to a substantial yield increase to profitable levels during the third year. Average yields almost doubled to 2.7 t/ha on average; more than half of the farmers exceeded the 2.5t/ha profitability threshold and only 10 percent fell below 1 t/ha. Complete production failure (including following field abandonment) virtually disappeared, declining from 18% (71/376) in 2019, to 13% (64/458) in 2020, and only 3% (5/137) in 2021. Credit reimbursement was virtually complete. Yet, the number of participating villages and farmers also declined dramatically to less than a third the number in 2020. Nonetheless, total rice production was similar as in 2019, even though the total land area contracted was 60 percent lower (251 ha versus 101 ha respectively). The contractual sales commitments (set at 1.25 t/ha in 2021 instead of 1.9 t/ha in 2019) were met—they did not exceed commitment despite higher yields. By year 3 of the pilot, the feasibility of profitable intensified smallholder low land rice production had been established. It provides a basis to build on, especially to scale. Volume is key for both the mills and the financial institution, to reduce the transaction costs per kg of paddy rice acquired and per FCFA of credit extended respectively, and make their business models profitable (Chapters 4 and 5).

**The pilot made smallholder rice production profitable, raising both yields and the return to family labor (in rice) by about a third.** To establish the contribution of the project, multivariate regression analysis was applied, comparing rice farming performance outcomes between pilot participants and nonparticipants in 2023, holding farmer characteristics constant and controlling for unobserved differences between pilot participants and nonparticipants that may affect both pilot participation and farm performance, and thus bias the findings on the effect of contract farming.[[54]](#footnote-55) Yields were on average 432 kg/ha higher among pilot participants (compared to nonparticipants), corresponding to an average increase of 19.4 percent compared to nonparticipants (Table 5), which can be fully attributed to the project.[[55]](#footnote-56) Net profits per ha and total net income increased by 57 and 56 percent on average respectively.[[56]](#footnote-57) Overall, and most importantly from the farmer perspective, the project increased the returns to family labor (in rice production) by an estimated 35 percent on average[[57]](#footnote-58). It corresponds to an average 1,263 FCFA per person day extra compared to the average return to family labor among nonparticipants (3,610 FCFA/person day). This is equivalent to the going daily wage rate for agricultural workers.

Table Effect of contract farming on smallholder rice performance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Yield (kg/ha) | Net profit (FCFA/ha) | Total net income (FCFA) | Labor Productivity (kg/person day) | Return to family labor (FCFA/person day) |
| Contract farming participation (1=yes) | 432.1∗∗ (180.05) | 0.57∗∗∗ (0.08) | 0.56∗∗∗  (0.10) | 0.01  (0.11) | 0.35∗∗  (0.16) |
| Household controls | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes |

*Note: All performance indicators relate to rice only and are expressed in logs (except yields). Labor productivity = total rice output/total person days (family+hired) devoted by the farm to rice production. Return to family labor = total net income from rice /family labor person days devoted to rice); Return on investment=total net rice income/production cost. The estimated coefficients represent semi-elasticities (except for yields where they represent the marginal effect). Household control variables include demographic and socioeconomic household characteristics; farmer attitudes (risk and information seeking attitudes, profit orientation, willingness to pay for and attitudes towards contract farming); rice orientation ( experience in rice farming) and plot characteristics (including soil type, slope, distance to homestead, water retention), agro-ecological features (occurrence of flooding during the season and average rainfall) as wella s market access (distance to nearest city).*

Source: Aihounton and Christiaensen, 2023.

**Better agronomic practices following agronomic training, higher output prices through improved varieties and/or input cost savings as well as improved access to credit and inputs all contributed to the pilot’s impact.** The project’s impact on the returns to land and family labor are about twice or more its effect on average yields. It shows that in addition to yield increases, higher output prices (compared to those obtained for traditional rice varieties) and/or input cost savings also contributed substantially. Yield increases mainly followed from better agronomic practices following agronomic training, not higher input use. Input use was similar between participants and nonparticipants.[[58]](#footnote-59) Yet, through credit provision and joint input acquisition and delivery the project enabled participants to access quality inputs more easily. Easy access to quality inputs was indicated by 84 percent of the 2023 participants as reason for pilot participation. The opportunity to get training and the close accompaniment by the project throughout the campaign were two other important reasons (reported by 50 and 30 percent of participants respectively). The challenge of coping with weather variability was further confirmed. Flooding proved particularly challenging. Farmers experiencing flooding saw their yields, ceteris paribus, on average decline by 292.1 kg per ha (about 12 percent). Bivariate comparison of the plot characteristics among farmers that never participated, those that dropped out between 2020 and 2021, first time particpants in 2021 and repeaters further shows that drop outs tend to have plots whose slopes are less likely to be composed of clay, flat and with good water retention capacity. It highlights the importance of assisting farmers cope with weather variability (too much and too little rain), including through better water management infrastructure, such as the construction or rehabilitation of lowland water catchment areas, or the provision of weather insurance products, though this fell beyond the purview of the pilot.

**Better rice for a better price?** In their attempt to maximize paddy rice procurement to maximize the operation of their mills, the millers had in practice bought up all the paddy produced for the project during the first two years of the pilot, irrespective whether the quality standards stipulated in the contract were met. The poorer quality source material impeded them to sell into the more remunerative segments of the urban markets and fully valorize the benefits from procuring the more costly, but higher margin, semi-luxury and luxury rice varieties promoted under the project. To explore the effect of incentivizing farmers and explicitly compensate them for their additional efforts, a randomized control experiment was conducted during the third year providing all pilot participants in half of the villages (randomly selected in each pilot region) the option of a 10 percent price premium if their paddy rice met all quality standards.[[59]](#footnote-60) The premium was in addition to extensive training on harvesting and post harvest handling and drying techniques, which was provided to all pilot participants (but not the other rice growing farmers in the village).

**Producers respond positively to training and price incentives to deliver better quality paddy rice.** Multivariate analysis controlling for a host of household (including risk preferences), plot and environmental characteristics (such as rainfall patterns just before harvest time to capture humidity), shows 1) that pilot participation per se disincentivizes farmers to meet the quality standards, 2) that these disincentives can be largely offset by training rendering the net effect of pilot participation and training on quality rice delivery zero, and 3) that farmers responded positively to the offering of a 10 percent price incentive, increasing the likelihood of delivering quality paddy by 15 percent. The difference mainly followed from better adherence to the humidity standards (rising from about 50 to 70 percent for the quality price premium eligible farmers). This ratio could likely be improved further by making humidimeters available at farm or village level. Many farmers in the Poro region overdried their paddy in response to the quality price premium. About three quarters of the farmers met the maximum impurity requirements and 90-100 percent met the minimum fermentation condition, without much difference among the different groups (nonpilotparticipants, noneligible price quality premium, and eligible price quality premium participants). Better harvest and post-harvest handling in response to the quality price premium may further have resulted in larger overall production. A positive effect of exposure to the premium on the total harvest was observed, though it was not statistically significant, a topic for further piloting and investigation.

**From subsistence to commercial orientation.** The shift to profitability over the course of the pilot also came along with a shift to rice farmers that were already more commercially rather than subsistence oriented. Only 41 percent of pilot participants were selling some of their rice before participating in the pilot in 2019 (Table 6). This increased to 69 percent in 2021. This evolution reflects both a move towards soliciting more commercially oriented rice growing villages by the project away from the originally targeted cash transfer beneficiary villages as well as a larger share of commercially oriented rice farmers within each village self-selecting themselves into the pilot. The shift in project orientation towards more commercially oriented rice growing villages accounted for more than half (56 percent) of this overall shift to commercial rice orientation among participants. Pilot participation during 2019-2021 declined among both subsistence rice farmers (from 24 to 12 percent) as well as among cash crop farmers growing rice for autoconsumption (from 33 to 19 percent). Among commercial rice growers one distinguishes growers without cash crops (specializing in growing rice) as well as growers with traditional cash crops who also sell a substantial share of their rice (considering rice as another cash crop.[[60]](#footnote-61)

Table 6 Evolution of commercial rice and cash crop orientation among the pilot eligible and pilot participating farmers, 2019-2021.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Share (%) | 2019 | | 2020 | | 2021 | |
| **Village rice growers** | **Participants** | **Village rice growers** | **Participants** | **Village rice growers** | **Participants** |
| Subsistence rice farmers | 30.2 | 24 | 25.2 | 17 | 30.2 | 12 |
| Commercial rice growers | 11.9 | 21 | 17.1 | 26 | 27.9 | 30 |
| Commercial cash crop growers | 37.6 | 33 | 34.0 | 26 | 22.1 | 19 |
| Commercial farmers (rice & cash crops) | 20.3 | 20 | 23.8 | 31 | 19.8 | 39 |
| Total farmers surveyed (unweighted) | 609 | 256 | 1363 | 540 | 458 | 135 |

Note: Subsistence: farmers that don’t sell their rice and grow no cash crops; Commercial rice: farmers that grow rice for sale, but don’t grow cash crops; Commercial cash crop: farmers that grow cash crops, but don’t sell rice; Commercial farmers: farmers that grow rice and cash crop for sale. Group shares of participants are based on village population weighted survey estimates.

Source: Barzola and Christiaensen ( 2023)

**The shift away from subsistence farmers is consistent with the commercial dynamic of VCD (as opposed to iVCD).** VCD stakeholders (mill, financial institution) seek to minimize learning and transaction costs and maximize volume, thus favoring a focus on villages and rice farmers that are already commercially oriented in rice production but may need additional help with accessing inputs, risk management and/or extension. This has been amply documented in the literature.[[61]](#footnote-62) The pilot experience is consistent. Contract compliance was also lower among subsistence rice farmers in the pilot (at least among those without cash crops). Subsistence rice farmers (without cash crops) recorded the lowest yields (800-1400 kg/ha lower than commercially oriented rice farmers with and without cash crops respectively), sold lower volumes, were less likely to produce quality rice and recorded higher credit default. It highlights the inherent challenge to shift farmers from subsistence towards commercial orientation. Yields were also lower among commercial cash crop farmers with subsistence rice orientation. Yet, based on their slightly better contract compliance performance, they may offer better prospects to make the shift towards rice commercialization.

**However, subsistence rice farming is not to be equated with poverty.**  A core objective of the pilot is to explore whether poorer farmers, taken to be cash transfer beneficiaries, can be assisted by linking them to more remunerative rice markets through contracting arrangements. This is in addition to exploring the potential of fostering rice import substitution by shifting smallholder subsistence-oriented rice farmers to more intensified rice production methods growing for sale. Subsistence farmers (without cash crops) are more likely female headed, but their farms are about as large as those of commercial rice growers (without cash crops) and they are equally well educated, with similar assets and slightly higher engagement in off-farm activities. But, they tend to cultivate less land and are slightly less educated than cash crop growers. Surprisingly, however, they are the least likely to be cash transfer beneficiaries among the four groups of farmers. In fact, it is cash crop growers that are more likely cash transfer beneficiaries, despite being more male headed, cultivating larger farms and possessing more assets on average. Subsistence farmers do not appear the poorest, or at least not poorer than commercial rice farmers.

**Inclusiveness remains a challenge, with poorer smallholders, as proxied by cash transfer beneficiaries, more likely to participate in the pilot, but less likely to reimburse, and their overrepresentation disappearing as financial eligibility criteria tighten.** A core question for the pilot is whether rice VCD can be made inclusive. For that reason, the project deliberately targeted cash transfer (CT) eceiving villages, with about half of the participating villages receiving CT in year 1 and 43 percent in year 2, dropping to 15 percent in year 3. The decline reflects both a shift in emphasis towards more commercially oriented rice growers to demonstrate profitability as well as a decline in the number of CT receiving villages as the cash transfer program started to end its 3-year course in many villages.[[62]](#footnote-63) Consistent with the CT selection criteria, CT beneficiaries had more children and were poorer (lower asset index). They were also much more frequent among the cash crop growers (especially those not commercializing rice) than among the rice growers.[[63]](#footnote-64) During the first two years of the project, CT beneficiaries were 20 percent more likely to participate.[[64]](#footnote-65) Consistent with the shift in emphasis on profitability and tightening eligibility criteria, including the 10 percent credit downpayment requirement, their relative advantage in project participation compared to non-CT beneficiaries disappeared in the last round. A higher share reported “fear of taking credit” as reason for nonparticipation (44 vs 31 percent for non-CT beneficiaries in 2021). They proved also less likely to reimburse the credit (by 10-15 percent). Involving poorer smallholders remains a challenge for rice VCD, both because of their lesser ability to shift towards higher input, higher output production models on commercial terms and relatedly, lower contract compliance, eroding their attractiveness for the other stakeholders and the sustainability of the VCD model.

**The pilot disproportionately selects male farmers, which tend to be richer and more commercially oriented already.** The vast majority of the participants is male (85 percent). Given that 92 percent of the households in the participating villages are male headed, this is to be expected. Participants are disproportionately male headed, however (98 percent), indicating that male farmers are more likely to participate than female farmers.[[65]](#footnote-66) Lower participation by female headed households (FHH) is consistent with FHH being poorer, more risk averse, and more subsistence oriented in their rice production. They are also less likely to receive cash transfers, have less land and less access to credit and when they get credit, the amount of credit taken is lower. While these features favor them from a social perspective, they don’t from a commercial and profitability perspective, as highlighted above. Female project participants also tend to produce less and sell a smaller share than male project participants. Concerted action is needed to increase female participation in contract farming, especially when organized on commercial terms, including to help them overcome social norms and take up credit risk, and engage with larger groups. This can be partly overcome through contracting female farmer groupings. While promoting female farmer participation was not a pilot as such, these are important insights for iVCD.

**Systematic farmer consultation through a representative survey reveals the following strengths and areas for improvement of the pilot:[[66]](#footnote-67)** 1) the need for better advertisement, 2) the simultaneous appeal and deterrence of input credit provision at commercial terms, 3) the importance of training; 4) the great demand for access to mechanization servces (threshing, ploughing); 5) the continuing room for more timely implementation of the transactions (introduction of the project, credit provision, payment); and 6) the importance of trust**.**

* First, better advertisement of the project is needed when scaling. While operating for the second year in 15 of the 20 participating villages in 2023, only 50 percent of all farmers indicated to be aware of the project. Two in five learned about it through the World Bank team, about 10 percent through the mill’s liaison agent, and the remainder through word of mouth (family, neighbors, other people in the village).
* Second, among those who did not engage in the pilot about half of them indicated to be afraid to take on a credit, while another 15 percent felt the information did not come timely enough to decide on. At the same time, easy access to the credit and quality inputs was highlighted by the overwhelming majority of the participants as an important reason for participation (84 percent. While the purchase of a credit (or the use of inputs, apart from the seeds) was not obligatory, its provision clearly addressed a need, while at the same time posing and important burden to engage in high input, high output rice production.
* Third, access to training (51 percent) was the second most cited reason for project engagement, underscoring the importance of personalized extension, despite general familiarity with rice cultivation and modern input use in the region.
* Fourth, about 50 percent of the farmers felt the pilot package perfectly responded to their needs, with access to mechanized services (or hired labor) cited by most others (70 percent) as the major omission.
* Fifth, contract compliance could be improved by the other stakeholders and the farmers. About a third of the farmers not fully satisfied called for more timely payment by the mills and financial institution, while 24 percent desired a higher sales price (some sideselling had been reported). More on both issues in chapters 4 and 5. About 10 percent of those not fully satisfied felt the package was insufficiently adapted to their farm land,
* Sixth, in the absence of readily available and inexpensive contract enforcement mechanisms, incentive compatible designs and trust building are key. On a scale of 1 (no trust) to 10 (full trust) participants score 1 to 1.5 points more trust in the president of the commercial grouping they established, in the project’s representative and the buyer than those who did not participate. Those who dropped out, also score 0.5 to 1 points lower on these trust scales.

## Lessons for iVCD piloting and scale up

**The pilot credibly established that high-input, high-output smallholder lowland rice farming on commercial terms can be profitable and brokered through a support program promoting rice contract farming along the lines tested in the pilot (though not upland rice).** It requires the timely delivery of an input and agricultural service package commensurate with farmers’ needs, sufficient attention to mentoring and extension, and competitive pricing. Timely access to quality inputs and mechanization are also important. To ensure incentive compatibility and contract compliance, slightly more advanced farmers who are already somewhat commercially oriented should be selected first, justifying the emphasis on commercial terms for input, output and credit pricing from the beginning to induce self selection, even at the expense of lower participation and volumes at the beginning.

**Establishing farmer profitability early on must be a primary objective justifying a focus on the slightly more advanced smallholder segments and underscoring the importance of action learning, data collection and analysis, and continuous adjustment and gradual evolvement.** VCD is comparable to clockwork, relying on the seamless integration of its different radars. Many logistical factors have to come together while room for error or time lapses is limited given the strict agricultural calendar and the tight competitive environment, with rice prices set internationally. Against this common background of multiple market failure and high transaction costs as well as limited capacity and trust, the simultaneous pursuit of efficiency and inclusion is often too demanding. Sustainability requires the establishment of profitability (efficiency) and trust among the stakeholders early on. This should be the primary objective at the outset, even when coming at the expense of scale and inclusion. While not all market constraints can be tackled at once, though no clear guidance emerged from the pilot regarding the optimal size and/or composition or sequencing of the initial support package, with the exception of the importance of access to quality improved seed varieties. The initial package should be identified through close stakeholder consulation and in full transparency, in support of already somewhat more commercially oriented farmers to keep the productivity gap surmountable, and with a focus on building the base for expansion. Simplicity in contract designs and procedures are key. Action learning through systematic data collection and analysis and structured consultation to inform feedback loops and adjust are further essential.

**Inclusiveness should be pursued through indirect rather than direct iVCD.** The emphasis on commercial terms for input, output and credit pricing from the beginning encourages self-selection of slightly more advanced farmers who are already somewhat commercially oriented. The objective of inclusion should be pursued through local diffusion of the intensified production approach, whereby leading farmers, who can afford to take more risks, engage first, while others follow once profitability is more clearly established, institutional arrangements such as farmer groupings start to take root and child diseases in project implementation have been addressed. This is also consistent with the profitability imperative of the other stakeholders and helps premature ending of the project. Experimentation with contract design features is also key to make them more incentive compatible, including the role of a credit downpayment in cash as self-selection mechanism and the use quality price premia to encourage quality production. As such, the promotion of contract farming may not be the right approach to immediately help cash transfer receiving households generate more remunerative activities. They may benefit further down the line, once the activity takes off, either by engaging directly in more intensified and/or contract farming (including through greater availability of improved inputs) or indirectly through the labor market, either as laborers on other farmers’ farms or through engagement in off-farm employment (e.g. construction) as the demand for nonfarm goods and services increases. To engage and support female farmers, special support interventions will be needed.

**Scaling and sustainability of smallholder contract rice faring requires the support package to expand and 1) develop access to machinery services, 2) invest in water and risk management and 3) communicate better the opportunities the program offers at village level.** Labor is no longer abundantly available in many of the rice production areas as underscored by the farmer reports.[[67]](#footnote-68) At the same time, local demand for machinery services (especially threshing and land preparation) largely exceeded supply. Even when present, to gain access to machinery services, farmers must coordinate the timing of their agricultural cycles (land preparation, harvesting) and aggregate their machinery service needs at village level to create scale reduce the transaction costs for the machinery service provider so that it becomes profitable. Well functioning farmer groupings are key for this (see Chapter 6). Concomitant development of machinery service value chains through project support is further needed. Mechanization also increases yields (through more timely and better land preparation and threshing) increasing profitability. Second, the substantial loss from the shifting rainfall patterns following climatic change (such as the late/early onset of the beginning/end of the rainy season, more excessive rainfall and field flooding as well as prolonged periods of drought) highlights the need for further development of the lowlands (and weather insurance products) to mitigate the increased risks from more intensified production methods. Finally, more widespread awareness of the iVCD product through better timely communication at village level is needed to increase participation.

# The Promise of Medium Scale Millers

## Context for the Pilot’s Rice Processing

**The Pilot’s interventions for Processing Units (PU) aimed to achieve objectives within a specific segment of the national rice market, set in the dynamic context of this larger market**. The specific objectives were to enable processing units of mid-market scale to mill rice from small-scale farmers into an improved quality product that could compete with imported rice of all but the top quality. The targeted processing units were in the 2t per hour capacity segment.

**At the time of the Pilot’s design, paddy processing into white rice in Côte d’Ivoire occurred across an array of mill scales.** These can be categorized in different ways, with ADERIZ most recently tracking mills according to four groupings: artisanal (under 500 kg/hour), micro-mills (between 500 kg and 1 ton/hour), mini mills (between 1 ton and 5 ton/hour), and industrial mills (5 ton/hour and above). This distribution of mill scales was relevant to Pilot design, which sought to incorporate into its activities milling partners that were geographically close to small scale rice farmers, interested in transitioning to contractual commercial relations with such farmers to ensure their supply of quality pady, and technically capable of producing a “semi-luxe” rice quality capable of attaining a price premium in domestic markets while being able to compete with imports. Tracking of mill numbers and milling activity, from ADERIZ monitoring in Table 7, showed that at the time the Pilot was being designed, micro mills with under 1 t/h capacity numbered over 2,600, accounting for over 90% of units, and nearly 75% of domestically milled capacity. However, the equipment used by this scale of mills was not technically capable of producing an improved quality of milled rice.

Table Paddy mills in Côte d’Ivoire, 2014-2022 trends in number and volumes, by scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 2014 | 2016 | 2018 | 2020 | 2022 |
| **Number of mills, by capacity** |  |  |  |  |  |
| Under 1 t/h | 1,836 | 2,635 | 2,635 | 2,185 | 2,401 |
| 1-2 t/h | 310 | 283 | 252 | 402 | 441 |
| 2-5 t/h | 6 | 6 | 8 | 4 | 15 |
| Over 5 t/h |  |  |  | 6 | 3 |
| Total number | 2,152 | 2,924 | 2,895 | 2,597 | 2,860 |
| **Paddy processed, metric ton** |  |  |  |  |  |
| Under 1 t/h | 871,686 | 534,158 | 568,362 | 352,161 | 168,323 |
| 1-2 t/h | 441,539 | 192,024 | 181,186 | 135,833 | 151,175 |
| Over 2 t/h | 28,486 | 12,389 | 23,008 | 15,093 | 4,607 |
| Total processing | 1,341,711 | 738,571 | 772,556 | 503,087 | 324,105 |

Source: ADERIZ, 2022.

**In-depth exploration during the Pilot design (World Bank, 2018) showed that mills in the 1-2 t/h category were best suited for the Pilot’s objectives.** They were concentrated in the main rice production areas, mostly privately owned, constrained above all by limited access to working capital, familiar with extending additional services to supplying farmers (inputs on credit, paddy transport to the mill, field preparation), selling milled rice mostly to local traders and households, and technically equipped to produce an improved quality of milled rice.

**Meantime, the Government’s strategy for the rice value chain (*Stratégie Nationale pour le Développement de la Riziculture*, SNDR) was concentrating on mills above 2 ton/hour capacity**, with the aim to have thirty mills of 5 t/h or greater capacity installed in cooperation with large private sector operators within a few years. Progress was slow towards this target over the period of the Pilot’s implementation with fifteen installed, and still only eight operational as of 2022 (i.e. one year after the pilot ended).

**The national rice milling context in which the Pilot operated at its outset was characterized by the predominance of four distinguishable commercial milling arrangements**. The first of these is toll milling, under which the farmer brings paddy to the mill, and retains ownership of the produced white rice for consumption at home or for sale, while paying a fee by volume of paddy that is milled. The second is comprised of toll milling, with the farmer leaving the milled rice with the enterprise with the latter providing the service of finding a market outlet. Third, the miller purchases paddy from farmers on a cash and as-delivered basis, mills it, and sells the milled white rice according to the interests of the miller. Finally, the miller can enter into a contractual arrangement with farmers, possibly involving miller pre-finance of farmer production costs (e.g. inputs or threshing), as well as an agreed price for delivered paddy, with the miller responsible for marketing on own account of rice that is processed under the contract.

**The Pilot aimed to assist small-scale farmers and millers to collaborate on production of an improved quality of milled rice that could meet the demands of a sizeable domestic retail market segment**. National demand for rice was in aggregate nearly twice what was being met by domestic production, with imports filling the sizeable gap. The largest portion of imported rice was improved quality (at least semi-luxe), of which Côte d’Ivoire mills produce very little (Table 8).[[68]](#footnote-69) The highest quality market segment - luxe - is primarily in larger urban areas and grows gradually as households shift to higher qualities as incomes improve.

**It was the aim of the pilot to demonstrate the feasibility of a package of interventions that would produce an improved quality of rice from domestic paddy that could compete with imported semi-luxe rice, particularly on secondary urban and rural markets**. And while the time needed to implement this package of interventions, and for its impacts to take hold and scale up, might take the better part of a decade, it is likely that consumer preferences across rice qualities will remain robust in this semi-luxe segment, even as household incomes grow. Over the 2016-2022 period, this quality segment was by far the largest of the national market and grew in volume over the period (Table 8).

Table Rice availability in Côte d’Ivoire, by quality, 2016 and 2022

|  |  |  |
| --- | --- | --- |
|  | **2016** | **2022** |
| **Imported rice, '000 ton** | **1,281** | **1,562** |
| « luxe » | 38 | 55 |
| « semi luxe » | 987 | 1,167 |
| « ordinaire » | 256 | 340 |
| **Ivorian domestic rice, '000 ton** | **1,335** | **1,107** |
| « luxe et semi luxe » | 22 | 16 |
| « ordinaire » | 1,313 | 1,091 |
| **Total rice availability, '000 ton** | **2,616** | **2,669** |

Note: Assumption made that all Ivorian domestic rice produced by mills over 2 t/h capacity is *semi-luxe* or *luxe*, and all rice produced by mills under 2 t/h capacity is *ordinaire*.

Source: ADERIZ (2022)

## Pilot Interventions for Processing Units

### Selection of processing units

**The Pilot established criteria for carrying out a rapid diagnostic of a sample of rice mills as the basis of partnering with one each in the eventual three Regions of implementation**. This rapid diagnostic covered 13 mills overall in the regions of Tonkpi (4), Poro (6), and Tchologo (3). All of the sampled mills had equipment capable of processing about 2 t/h and were further assessed according to characteristics that first and foremost covered the quality of its personnel amongst other capacities. The four key personnel to have on board or be willing to engage were: (i) a plant manager on site[[69]](#footnote-70); (ii) an equipment operator capable of achieving sufficient milled rice quality and milling rates; (iii) an accountant capable of book keeping, stock management, and of implementing an analytical accounting system; and (iv) a production officer able to coordinate with contract farmers on improved farm practices and contractual performance. In addition, the diagnostic sought information on: (i) governance of the enterprise; (ii) the enterprise’s activities; (iii) the vision of the enterprise leadership; (iv) relations with farmers and farm input supply; (v) milling operations and quality management; (vi) marketing; (vii) enterprise administration, accounting, and financial management; and (viii) human resource management.

**The diagnosis of this sample of mills in the three regions revealed that the level of professionalism was in general quite weak**. Itenabled, however, the establishment of agreements with three of the mills, which included a technical assistance component that was initiated so as to increase their technical and operational capacity.

### Technical assistance for capacity building in the Processing Units

**Technical assistance was provided by the Pilot to one mill per region on management and marketing**. While the costs of the technical assistance provision (both technical training and accompaniment support) were borne by the Pilot, the mill undertook the costs of staff recruitment for capacity upgrading (accountant, and farm production liaison), computer equipment and software upgrading for financial management, and marketing analysis.

**The technical assistance provided was tailored to each mill’s specific capacities and needs, but common elements were at the core of activities**. More specifically, the TAP produced training materials and undertook training of the mills’ Production Officers for their activities with farmers. Comprehensive technical assistance was also provided to the key mill personnel to strengthen capacity on all aspects of business management: business planning, internal controls, marketing strategy, financial and credit management, inventory management and product quality improvement, and implementation of contracts with farmers for delivery of paddy. Specific support aimed to strengthen the mills marketing strategy for anticipated production of improved rice quality. Continuous technical assistance accompaniment by the TAP focused on financial management, accounting and servicing of the credit received by the mills to finance paddy procurement under the contracts with farmers as well as equipment and process upgrades to mill a higher quality rice.

**This achieved improvement of the millers’ understanding of specific needs for profitable operation under contract arrangements with farmers.** Each of the mills’ personnel were provided with a job description and clearer understanding of responsibilities within an organizational context. The mills achieved a sharper definition of needs to attain profitability inclusive of marketing activities, and management of fixed and variable costs. Planning, operational, and managerial capacity was strengthened.

### Credit provision

**The mills were supported in mobilizing commercial credit to cover the period between acquiring farmers’ paddy and selling milled rice**, through estimation of credit needs, preparation of credit requests, and management of relations with the credit provider. The credit provider, who was also engaged in providing working capital loans to the farmers involved in the Pilot and who committed under contract to delivery of specific quantities (and qualities) of paddy to the mills, provided finance to the mills on the basis of the cumulative amount of paddy that the mills were obliged to purchase at agreed prices under these contracts.

**The finance taken on by the mills through this process was excessive initially** because the farmers underdelivered contracted amounts but tightening up of procedures in the third implementation year brought improvements. In the first year, for instance, the mills took on (and were granted) loans that turned out to be much more than what they needed to procure the paddy that their contract farmers delivered, resulting in the mills paying interest on a larger loan size than they needed. By the third year, farmer selection and plot size estimation were conducted more scrupulously, resulting in better performance on contract quantities delivery, as well as better estimates of mill commercial credit requirements (see Section 5 of further details).

## Implementation Experience

**The operational experience with the Pilot’s interventions differed markedly across the three originally selected mills**. Despite the careful diagnostic inventory conducted and subsequent selection process for establishing the mill partners for the Pilot, one of the three mills performed so poorly in the first implementation year that it was replaced by an alternative milling enterprise for the remaining two years of implementation in that region (Tonkpi). The issues that led to this rupture included poor communications by the mill with contracted farmers, dysfunctional staff management including the production officer quitting over perceived non-respect of the work contract, and non-recruitment of a qualified accountant, and opaque commercial operations of the enterprise.

**Key constraints on mill participation and financial performance that affected all mills during Pilot implementation related to limited farmer contract compliance in terms of quantities and quality and adjustments were made to address these.**  First, as previously mentioned, the mills’ financial expectations under the introduced contract farming were not met because of *farmers’ underperformance on quantities of paddy delivered to* the mills. As indicated, this improved by the third year of implementation as interventions at the farmer level achieved a closer approximation of contracted quantities (Table 9), but participation and the committed amounts had also come down. With their financials under pressure because of these constraints on paddy quantities, the mills argued that carrying the cost of the production officers was beyond their means, and in the third implementation year, the salaries and operational costs of these liaisons to the farmers were transferred to the Pilot budget.

Table Sales commitment and delivery under the Pilot, 2019-2021

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2019 | 2020 | 2021 |
| Total rice paddy committed (tonnes) | 761 | 601 | 124 |
| Total rice paddy sold | 295 | 182.6 | 124 |
| Compliance share (%) | 38.7 | 30.3 | 100 |

**Second, since mills under the Pilot were through contracts with farmers taking ownership of the paddy for milling, it was important to their risk management to strengthen their marketing strategies for the milled white rice.** The mills were assisted through the technical assistance provided in developing their marketing plans. This included helping the mills to establish contacts with providers of product packaging materials, to design labelling and branding, and to identify sales outlets. One of the mills advanced the furthest in defining a marketing plan that envisioned marketing three levels of quality of white rice, with the higher qualities to be in smaller volume packaging with branding and higher pricing and outlet targeting of wholesalers, retail outlets, and direct sales to local government salaried employees.

Despite the intentions and efforts of this mill, and actual delivery of a lot of eleven tons to a retailer in the capital city, the marketing experience was not a success due to inadequate quality compared to white rice from domestic suppliers from other production regions, with this quality constraint largely arising at the farm production and threshing stages. This further contributed to lower profitability of the contracted rice approach for the mills than anticipated and their deteriorating financial performance. Greater attention to ensuring good quality at farm level, through training and a price quality premium experiment, was pursued in response during the third year, with success (see 3.3). The combined positive effect of training and the price quality premium more than offset the negative incentives of quality adherence introduced by project participation. Nonpurchase (or purchase at a lower price) of poorer than stipulated quality rice proved very difficult to enforce in practice at village level, unless quality was extremely poor.[[70]](#footnote-71) It was often also not pursued in practice by the millers due to lack of or poor functioning of the equipment to check the quality.

**Two other reasons for deteriorating financial performance of the mills include the particular features of the credit design and acquisitions as well as alternative credit use.** The mills’s marketing strategy was often largely focused on meeting their short term credit reimbursement requirements, which stipulated that one third of the total 9-month credit had to be reimbursed every three months. It prevented them to roll over the funds multiple times and/or to benefit from the seasonal white rice price fluctuations (lower at harvest, higher during the dry season). One of the mills also used the working capital credit partly to reimburse another loan taken to construct and equip a new milling station.

## Main Determinants of Favorable Outcomes on the Milling Component

**The Pilot fell short of its aims to place medium-scale rice millers in the role of pulling contracted small-scale farmers into a better-structured value chain, but the trends in the right direction attained by the third year point to key areas for favorable outcomes**.

**Cost reduction in reaching farmers is an important aspec**t. Transaction costs for the mills of interaction and coordination with contract farmers are related to the size and number of farmers. With the preferability that the production agents be integrated into the mills’ costs and managerial direction, the operational costs of these agents can be made more efficient by focusing on fewer, larger farmers able to deliver on larger contract commitments, and on farmers who are more geographically concentrated, so as to facilitate logistics of reaching and communicating with them. This implies some trade-off on the Pilot’s initial prioritization of targeting smaller, subsistence rice farmers and bringing them into commercial value chain activities.

**Improving the predictability of performance by individual farmers on contracts is another key area, in which the Pilot made progress through operational adjustments**. Greater attentiveness of the production officer, and involvement of the CIG, enabled more accurate estimates of farmer plot sizes to underpin contractual commitments, greater clarity of farmers on contractual obligations, and better farmer implementation of improved production techniques to increase yields and quality. Operational attention of these sorts led by the third year to farmer deliveries of quantities and quality closer to contractual amounts, thereby reducing the operational risks of the mills and providing a better basis for marketing efforts for their white rice produced. Interestingly, the simplicity of the price clause of the contract with farmers did not seem to factor significantly into farmer compliance with quantity delivery commitments. Despite the risk that the contract price, set in the planting season, could diverge from the market price at harvest time, the analysis of the actual difference (2020 season) showed that this was not an important determinant of the quantities that farmers delivered. For this period, at least, side selling was not an opportunity that tempted farmers to divert production away from their contract obligations.

**The aim of the Pilot to strengthen the mill’s placement of improved white rice product into domestic markets was underpinned by sensible interventions but needed more time for implementation**. It was only in the third and final year that mills started to receive larger quantities of better-quality paddy that enabled producing a quality semi-luxe product. Tightening up this farmer-mill portion of the chain is essential for mills to be able to venture into the development of relations and agreements needed for the marketing component to be profitable for the mills.

**The mills’ financial interest in pursuing the improved rice market segment could also be improved by more flexible credit terms.** In the Pilot’s third year mills paid a sample of farmers a 15 FCFA/kg premium for better quality paddy, which translates into a 25 FCFA/kg cost increase for milled rice. Mills were only able to recoup this additional cost if market prices enabled selling at an equivalent or higher price, which were attainable only with the seasonal price increase of the lean season, but not with immediate post-harvest sales of milled rice. So mills were constrained if their credit terms required repayment shortly after the harvest, making seasonal stock management difficult.

## Scaling Up

**The Pilot’s outcomes, though decidedly mixed in relation to its initial aims, nonetheless offer guidance for scaling up to positively impact the value chain segment of domestically produced, semi-luxe improved rice**, which comprises 45 and 75 percent of national rice consumption and imports, respectively. Lessons can be drawn on farmer-miller coordination, effectiveness of technical assistance delivery, the entry pathway for mill participation in value chain supports, and appropriateness of the chosen market segment targeting.

**Profitability of mill participation in contract farming depends on them securing a larger (and more predictable) volume of good quality delivered paddy than was achieved under the Pilot**. This implies the mills need to work with a larger number of farmers, even if some of the volume increase can come from concentrating on larger farmers with better yields. Mills thus need internal capacity to coordinate with farmers and to implement a strategy of farmer targeting, selection, communication, and improvement of incentives so as to avoid farmers side-selling their production. Bringing the production officers’ tasks back under the managerial oversight and budget responsibility of the mills is thus an important structural configuration to achieve as part of value chain strengthening.

But the Pilot’s experience also points to the limitations of improving mill profitability through internal capacity building alone. The relative scarcity of zones with concentrations of available land with comparative advantage for rice production is a basic constraint to mills access to a reliable supply of quality paddy. Further investment in water control will reduce farmers’ risks in pursuing more input intensive rice production technologies, enabling both production and quality improvements, making mills supply more efficient, and facilitating a marketing strategy based on commercialization of semi-luxe milled rice.

**The intensive and individualized provision of technical assistance to mills under the Pilot needs to evolve to a more efficient delivery model for scale-up affordability**. Building on existing national structures for small enterprise capacity building offers opportunities for affordable effectiveness. Those responsible for value chain strengthening can take stock of such available institutional capacities and enter into agreements with those best placed to provide support for millers. ￼ Once the OIA-Riz is financially operational, its activities on mill capacity building could be coordinated through its chamber representing milling members and with ADERIZ to put such technical assistance support in place.

**The process for determining the eligibility of mills for entry into program support needs to be rethought.** While the Pilot’s rapid diagnostic phase generated useful information that could inform a mill’s dossier for application for support, it could be a better screening process for mills to self-select on participation. Self-selection for application, along with selection criteria for acceptance into technical assistance supports at different levels (such as agreement to pursue a farmer contract approach), could improve readiness of mill participants to fully engage in capacity building activities.

**Any initiative to scale-up support to rice mills for capacity building to operate within a value-chain set of partner relations would be justified in including a focus on the 2 t/h scale mills.** Mills of this size process a significant portion of domestic production and are in adequate proximity to farmers in the main production regions as is beneficial for partnering in a contract farming approach. Capacity building for this segment of the domestic milling industry is certainly at least a medium-term undertaking, but this is worth pursuing since the semi-luxe rice quality market segment in which these mills can be competitive seems likely to remain substantial in size in view of current dynamics on both the supply and demand side for this quality of rice. A separate risk that policy makers will need to navigate, is the avoidance of distortionary support for larger mills (5 t/h), on which public support for investment has concentrated in recent years, that could have collateral and unintended negative effects on the relative competitiveness of the smaller 2 t/h mills.

# Providing the Financial Glue

**Underfinancing of agricultural value chains, especially staple chains, is widespread in Sub-Saharan AfricaSA.** Three factors contribute to this. First, there is a long time lag between the initial outlays for production and the final purchase by urban consumers. This results in sizeable working capital needs for agri-SMEs (up and downstream) and when intensified production methods are used, also substantial input credit needs for farmers. Second, agricultural production is particularly risky with little tangible collateral available. It increases credit default by farmers but also jeopardizes the profitability of up- and downstream actors given insecure quality supplies. Third, because of this, and further compounded by price risks, banks typically don’t want to engage in agriculture, while the financial capacity of most private sector agricultural value chain actors is too limited to carry the chain. According to the estimation of ISF Advisors[[71]](#footnote-72), only 1/3 of the agri-SME financial needs are met in Sub-Saharan Africa (SSA). Given the multitude of small loans, the transaction costs of credit provision to smallholders are also large, unless loans are distributed through producer organizations. As a result, agricultural input credit use by smallholders in SSA, formal and informal, is extremely low (across credit type, country, crop and farm size categories).[[72]](#footnote-73)

**Rice in Côte d’Ivoire is not different**.**[[73]](#footnote-74)** Value chain underfinancing holds even more for staple crops, such as rice, where the margin for value addition is more limited, given more limited opportunities for product differentiation, more limited organization of farmers around staples, and increased risks of contract hold up (by producers as well as buyers) and thus credit default. According to ADERIZ, the Ivorian rice sector requires annually financing of about 500 billion FCFA, which the government alone cannot mobilize[[74]](#footnote-75). According to the World Bank Côte d’Ivoire Agricultural Sector Update (2019), the main constraints for agricultural producers to access financial services in Côte d’Ivoire are : *“(i) a still insufficient rural branch network; (ii) the reluctance and lack of capacities of banks to deal with credit to agriculture, with a perceived high risk without any possibility of guarantees ; (iii) the low credibility and reliability of most cooperatives as retailers of credit ; and (iv) the high real interest rates on loans (MFI generally charge up to 30% p.a.) which is not compatible with the financing of most investments.*” Currently, about one third of the farmers in the Pilot areas report to have access to credit. Unsurprisingly, access to credit (and quality inputs) is overwhelmingly reported as the main contribution of the project by the participating farmers (section 3.3).

**This section reviews the Pilot’s experience and emerging lessons in addressing the challenge of providing finance in smallholder rice iVCD.** It begins by describing in more detail the financial needs of the key actors, followed by a review of the risks and transaction costs for the finance provider to meet these needs. The Pilot’s approach and its performance are presented next. The section concludes with a number of suggestion for improvement.

## Substantial financing needs face limited supply

**The farmers’ needs for financing exist at all stages of rice production.** At the beginning of the agricultural season, farmers need to acquire inputs (certified seeds, fertilizers, hired labor, mechanized services). This is also the period when farmers are most liquidity constrained, making external financing necessary.[[75]](#footnote-76) Other financial products such as crop insurance also need to be contracted at the beginning of the agricultural season. At harvest, farmers need financial solutions that enable buyers to pay them immediately, or alternatively, financing arrangements that enable them to receive (some) cash against their harvests such as warehouse receipits. After receipt of sale revenues, farmers might seek savings products (in a bank or digital financial services accounts) that can be used to support the rice farmer in financial planning and management. Finally, in the long term, farmers could need financing to develop and/or irrigate their plots or buy new land.

**Mills need both investment and working capital, with obtaining the latter often the most challenging.** The financial needs of rice mills encompass two main areas. First, theyneed substantial capital to acquire milling machinery, storage facilities, drying systems, and packaging materials. Second, access to credit is essential to meet the liquidity needs of purchasing paddy rice. Adequate financial resources allocated to these areas would enable the rice mills to thrive in the competitive market, deliver superior-quality rice products, and maximize profit. Over the years, much attention had already been given to strengthening the millers’ capital equipment. Yet, access to working capital to evolve from on-demand fee-based milling for which the margins had dramatically declined, to an increased margin business model whereby paddy is bought, milled and sold, remained a major constraint.

**But farmers are generally considered high risk by financial institutions.** Their production and agricultural performance are subject to multiple risks, including climatic and agronomicrisks, input quality uncertainty, and human error. Moreover, their exploitations are subject to large heterogeneity. Except if tests are performed, information on parcel quality is private to the farmers thereby introducing information asymmetry, making it harder to assess individual creditworthiness. In addition to production risks, they also face substantial market and price risks, with prices fluctuating substantially across seasons and years.[[76]](#footnote-77) Being price takers, farmers can only undergo these fluctuations and diversify to minimize the overall risks to their portfolio of crops and activities. This in turn limits crop specialization (while increasing the transaction costs for the mills and the financial institution).

**Mills also face a fair amount of uncertainty**. First, there is uncertainty around the quantities of paddy rice available on the market. Acquiring sufficient rice to operate the mills at sufficient capacity to cover the fixed equipment costs is a frequently cited challenge. Low paddy quantities can be caused by farmers producing or selling little paddy, as well as by a lack of liquidity on the part of the mills at harvest time to buy it. Second, there is uncertainty about the quality of the paddy rice purchased, which has an impact on the quality of the white rice produced and on the final price of the white rice. Finally, for the credit institution, it is hard to assess the SME’s managerial capacity and their marketing reach. The mills participating in the Pilot were characterized by poor managerial and organizational capacities [[77]](#footnote-78) and limited reach into the higher price fetching improved rice variety markets in the cities, which complicates the assessment of their credit applications.

**Therefore, commercial banks can be particularly reluctant to provide credit** to the agricultural sector given asymmetries of information, unstable revenue, clients’ lack of formal credit history, lack of collateral such as titled land, and the risk of fungibility of the credit. In addition, financiall institutions typically also face weak judicial environments, increasing the cost of credit recovery as well as the likelihood of credit default itself. With credit recovery less likely, the cost of default for borrowers also decreases. All of these factors result in credit rationing, undermining market and value chain development.

**The limited local presence of financial institutions further limits access to finance by farmers and agri-SMEs.** Local presence reduces the transaction costs of credit provision and acquisition. It helps financial institutions know their customers, tailor their products and monitor and enforce reimbursement. It also reduces the cost for farmers and agri-SMEs to seek out the credit information and comply with the conditions to file their credit applications. Yet, for the reasons listed above most financing structures do not have branches in rural towns, limiting access to credit by small rice producers and SMEs (mills).[[78]](#footnote-79) The MFI participating in the Pilot was one of the only MFIs present across the three regions of implementation and interested to participate. Digital finance provision could also be an option, but wasn’t sufficiently developed yet at the time of the Pilot and still needs the establishment of first time contacts. The MFI participating in the Pilot is profit-oriented.[[79]](#footnote-80) Yet, by way of compromise, it agreed to give smaller loans than usual to the smallholder rice farmers to diversify its portfolio and increase its client base. The MFI’s strategy was understood to adopt a deficit behavior temporarily while building up a new clientele before returning to profit.[[80]](#footnote-81)

## Reducing the cost of credit access and provision

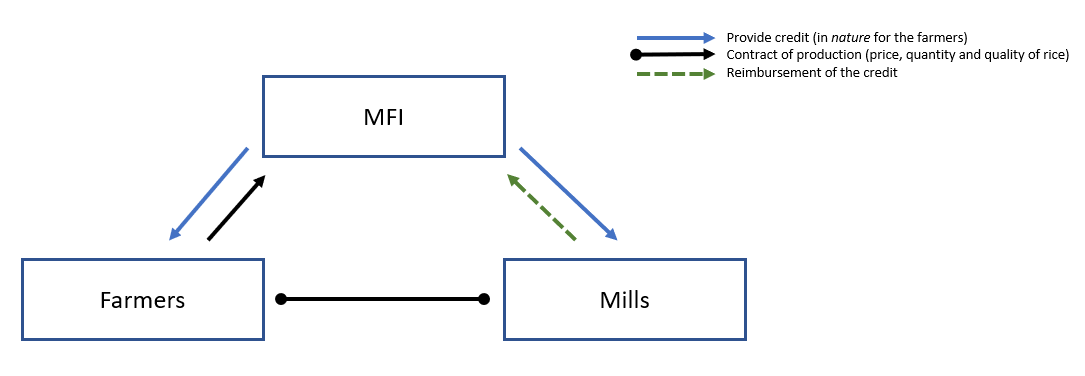
**The risks and transaction costs in credit provision in rice in Côte d’Ivoire are high.** From the credit provider’s perspective, the profitability of credit provision is determined by the costs of its money (such as the interest rates on savings), the transaction costs in providing the credit, and the risk of credit default, with profit margins eroding rapidly as credit default risk increases. For credit acquisition to be viable for the borrower, the returns to the investment must be large enough to offset the additional cost of financing and not too risky for the firm/farm to remain solvent. Both the risks and transaction costs in credit provision/acquisition for rice production in Côte d’Ivoire are high.

**At the same time, the Pilot deliberately sought to establish interactions among the stakeholders on a commercial basis from the beginning, also in credit provision, to foster sustainability.** Research evidence suggests that mitigating factors and careful allocation of funds can make agricultural credits not riskier than non-agricultural credits for the private financial sector and therefore potentially sustainable for MFIs (Meyer, 2011; Weber and Musshoff, 2012)*.* This encouraged the Pilot to proceed with its objective to encourage commercial market functioning and to limit to a minimum any distortionary project intervention. Following steps were taken to reduce transaction costs and mitigate the risk of default.

### The Pilot’s innovation to minimize credit default

**Four complementary channels were used to mitigate the risk of credit default: 1) a contracting arrangement between farmers and mills; 2) specific design features of credit allocation, 3) substantial investment in technical assistance to farmers and mills, and 4) project presence and intermediation.** First, and foremeost, farmers and mills were organized around a delivery contract. The contract fixed the sales price at harvest as well as the contracted rice quantity and quality for delivery immediately post harvest. The contract provided the basis on which farmers could apply for credit at the MFI. By taking away the price risks for the farmers, the contract increased farmers’ capacity to reimburse, while the stipulation of immediate post harvest delivery reduced the risk of side-selling. Importantly, through the contract, farmers also became eligible for agronomic advice, increasing the likelihood they would attain their delivery targets (and be able to reimburse the credit). While farmers were obliged to enter in a contracting arrangement to participate in the project, taking a credit was not obligatory. Yet virtually all participants took up a credit. Finally, the total rice volume contracted with the farmers further formed the basis for determining the credit amount for the mills. The contract reduced the risk for the mills not to be able to procure the necessary amount of paddy, while assuring the credit institution that the farmers would have a buyer and obtain the necessary cash to pay for the credit.

Figure 4 Tri-partite financial relationships in the rice Pilot



MFI=microfinance institution

**Second, a number of credit design features were introduced to reduce alternative uses of the credit and production failure.** Particularly, to guarantee good use of the credits and to limit the risk of credit fungibility, the credit design originally excluded any access to the credit as cash by the farmer. The credit was transferred directly to the input provider in payment for the inputs, while the farmers directly received the inputs, and the reimbursement of the credit was done directly from the mill to the MFI based on the amounts of paddy picked up by the mill in the village (Figure 4). Any amounts in excess (or short) of the credit had to be cashed in (or paid) by the farmers directly at the bank. The mill owners, in turn, were provided with a credit equivalent to the contracted paddy amount. Through these procedures the MFI tried to keep a tight control on the cash flows and have them mainly circulate internally within its accounts. Second, to further reduce the risk of default borne by MFIs, the pilot identified factors relating to the agricultural success of the farms. After the first year of implementation, participating farmers were required to present a minimum size of a suitable low-land plot available for rice cultivation, which was verified by the credit agents, and upland rice was no longer financed.

Furthermore, security deposits were required to create an entry barrier to the pilot and reduce the risks borne by MFIs in the third year (by reducing the de facto amount of credit extended and reducing the risk of default through more strict self-selection).

**Third, to control and reduce the risks of limited production (and post harvest quality loss) and strengthen the managerial capacity of the mill owners, the Pilot included an important capacity-building component for farmers and mill owners**. Investment in extension was substantially expanded during the second year. A demonstration plot was set up in each participating village and intensive training was provided throughout the different stages of the growing season (4 months in total) at a ratio of one extension agent per 5 villages. The organization of demonstration plots and individual mentoring was continued during the third year, albeit with greater reliance on trained trainers as well as the liaison agent of the mills. In addition, individual logistical support and mentoring was offered to the mills to help them organize their business plans and manage their cash flow.

**Fourth, continuous presence, data collection, and intermediation by the project representative officer was pursued to instill trust among the partners and reduce credit default**. The commercial nature of the contract and the obligation to reimburse were also very clearly communicated during the introduction of the project. Indeed, the fear of not being able to reimburse the credit was the most cited reasons for nonparticipation (ex ante).

### Transaction costs substantially complicated credit provision

**The transaction costs in credit provision and acquisition can be substantial.** Transaction costs are the total expenditure incurred during the creation and execution of a contract. In the absence of farmer groupings around rice in the Pilot’s target areas and villages, contracts were issued to individual farmers instead.[[81]](#footnote-82) This substantially increased the transaction costs of credit provision. Each farmer had to be reached and contracted individually. Literacy rates and familiarity with the formal financial system among farmers was limited. And the bureaucratic procedures to open an account and credit file were heavy and ill adapted to the rural and farmer context. They had been designed for serving urban, not smallholder farming enterprises in rural areas. As a result, understanding the contracts and preparing the necessary documents (identity papers, titles of property, etc.) were a substantial burden for farmers, who often had minimal education. The requirement to do many of the transactions at the MFI branch in town further added substantial costs and delays, despite the deliberate choice of engaging with villages within a reasonable distance from the town (i.e. 25, later extended to 50 km from the MFI). The bureaucratic and centralized approach taken by the MFI was also not conducive.

**To facilitate farmers’ participation and reduce transaction costs, the Pilot implemented an increasing series of measures during the project.** First, to ease the burden of the increased transaction costs borne by the MFI given individual credit provision and contracting, the Pilot financed *credit agents*. Their mission was to facilitate the signing of contracts between farmers and the MFI by navigating across villages. They had to inform potential participants of the credit terms and conditions, help them put together their application files, take the files of potential participants to the regional micro-finance institution, and finally ensure that the rice sale and farmer payments were correctly implemented. They further had to monitor the campaign to anticipate the expected harvest, timely signal potential credit default risks, and adjust the amount of credit for the mills in light of the anticipated harvest and contract delivery compliance.

Second, in addition to facilitating the process of obtaining credit, these agents were also responsible in the first year of implementation for selecting and contracting input suppliers in agreement with the GICs. However, during the second year of implementation, several farmers refused to purchase the inputs that arrived late and were unsuitable for the fields and rice cultivation. During the third year of implementation, the project representative together with the mill and farmer representatives took on the task of aggregating the total input demand, placing the orders and monitoring their timely delivery.

Finally, efforts were made to limit the transaction costs borne by the mills and the MFIs associated with dealing with a large number of dispersed farmers. The farmers in the same village were aggregated into informal Groups of Commercial Interest (GIC) to simplify communications and coordination with farmers at the village level. During the last year of the project, first steps were taken to officialize the GICs so that they could become credit takers themselves, which could further reduce the transaction (and fixed credit) costs for the MFI and the farmers.

**Beyond these support measures, the credit conditions were fully commercial, for the farmers and the financial institution**. No partial credit guarantee was given to the MFI, but during the first year of implementation farmers were exempted from paying the account opening fee. In principle the scheme provided the MFI with a lucrative formula to ensure credit offtake throughout the year, first to finance the inputs of the farmers at the beginning of the agricultural season, with this volume of credit then passed on to the mills and normally augmented with the necessary amount to buy back the total committed amount of paddy rice. In principle the value of the committed volume of rice should vastly exceed the credit cost, though in year 3, farmers were left to choose the amounts of rice they committed for sale, with many of them setting the amount at the minimum level, i.e. enough to cover the credit cost.

### Identifying a financial partner

**Despite the mitigating measures, few financial institutions were able, willing or too expensive to join the Pilot’s consortium.** While there was a rising interest to engage with agricultural value chains, especially among MFIs, most had only just started to engage with cash crop chains and very few had experience with staples, including rice or maize. Furthermore, very few financial institutions (including the MFIs) were present in all three regions, and if present (or willing to operate in all three regions) they were either focused on smallholders or SMEs (like the mills), the caps they posed on the SME loan size were too low to finance the purchase of the contracted rice, or they only provided credit to farmer groupings, not individual farmers. And while they were often better digitally equipped and experienced in offering credit to smallholders directly at village level, the cost of their credit and the fringe conditions under which they operated were overall less amenable to the way the Pilot was designed compared to the conditions proposed by the MFI with which the Pilot eventually partnered (See Table 10 for farmer credit conditions). Despite the mitigating measures, several MFIs were also reluctant to take on the financial risk of credit default which in the absence of a credit guarantee or any other larger agricultural input or service provider and/or buyer with whom the risk of credit default could be shared, was fully carried by the partnering financial institution. The MFI tried to spread this risk later on somewhat indirectly through delayed partial payment of the input providers till after the harvest (though still independent of farmer credit reimbursement).

Table Farmer credit conditions

|  |  |  |  |
| --- | --- | --- | --- |
|  | Year 1 | Year 2 | Year 3 |
| Purpose of the credit | Purchase of agricultural inputs | Purchase of agricultural inputs Payment of agricultural services (ploughing, hired labor, threshing) | Purchase of agricultural inputs Payment of agricultural services (ploughing, hired labor, threshing)) |
| Account opening fee | 13500 FCFA | 0 FCFA | 13500 FCFA for repeating producers who haven’t paid yet; 0 FCFA for new producers |
| Maximum amount | Input value1) : ……FCFA | Input value1) : … FCFA  Value of agricultural services: …FCFA | Input value1) : … FCFA  Value of agricultural services: …FCFA |
| Security deposit | 0% | 0% | 10% of the total loan |
| Duration of the loan | 6 months | 6 months | 6 months |
| Time reimbursement | Full amount after 6 months | Full amount after 6 months | Full amount after 6 months |
| Interest rate | 1% per month | 1% per month | 1% per month |
| Account costs | 1 300 FCFA per month for 6 months | 1 300 FCFA per month for 6 months for repeating producers;  0 FCFA for new producers | 1 300 FCFA per month for 6 months for all producers |
| Life insurance | 1% of total credit per year | 1% of total credit per year | 1% of total credit per year |
| Credit file costs | 1,5% of total credit with a 5 000 FCFA ceiling | 1,5% of total credit with a 5 000 FCFA ceiling | 1,5% of total credit with a 5 000 FCFA ceiling |
| Credit release | In parts as inputs are bought/paid to the input providers | In parts as inputs are bought/paidSeasonal need for the activity | In parts as inputs are bought/paidSeasonal need for the activity (per GIC order) |

Note : 1) Amount of the loan cannot exceed the value of the recommended input package based on the measured and vetted area contracted for rice production. The value of the loan for agricultural services is similarly based on the estimated cost for these services based on the vetted area contracted for rice production.

Table 11: Mill credit conditions

|  |  |
| --- | --- |
| Use of the credit | Purchase of contracted rice |
| Interest rate | 18% per year |
| Périodicité | Bimensuelle, |
| Life insurance | 1% of total credit |
| Credit file cost | 1,5% of total credit |
| Maximum amount | Sufficient to purchase the total amount of contracted rice committed for delivery |
| Duration | 6 months originally, 12 months in subsequent years |
| Guarantees | 10 percent of total credit ; other guarantees such as buyer commitments of white rice |
| Release of the credit | Deposited on the account of the mil |
| Credit disbursement | In parts as they buy the contracted rice and give the order to reimburse the farmers, not to withdraw as cash |
| Finance mechanism | Opening of farmer accounts and credit files based on the contracted rice area ; purchase of committed rice under contract ; reimbursement of credit by farmer from the mill’s account based on the amount delivered. Reimbursement of the loan by the mill after purchase of the white rice by the wholesale/retail buyer |

## Financial service delivery in action

### The reach and efficiency of credit access

**The pilot successfully contributed to financial inclusion of the rural population, but the credit provision and payment process was fraught with inefficiencies.** The pilot was designed to facilitate access to credit to rice growing smallholders. In this, it succeeded. Prior to their participation in the Pilot, 22, 29, and 48% of the participants had a bank account in a formal financial institutions during the first, second and third Pilot year respectively. Clearly, through the project many more farmers got pulled into the financial system.[[82]](#footnote-83) However, numerous problems were encountered in the distribution of credit. As discussed above, the procedures of obtaining the credit and being paid ex post were too centralized in the towns and too cumbersome. Many corrective actions were taken throughout the project, bringing the subscription of farmers and the necessary paper work directly to the villages, which greatly helped. Much room for improvement, in particular more timely and less burdensome credit issuance remains, including also for smoother account access upon payment.[[83]](#footnote-84) Digital finance initiatives hold a lot of potential to substantially streamline the process, but were not sufficiently developed yet in the region at the time of the pilot.

**More flexible allocation of credit can help reach a larger population, guarantee efficient use of the credit, and increase reimbursement rates.** Because of slow credit issuance, the MFI also created some delays in the payment to the input supplier, contributing to delays in the delivery of inputs and inadequate input delivery in the second year of implementation. This in turn caused substantial decline in yields, undermining farmers’ and mills’ capacity to reimburse and overall trust in the Pilot. The mills too experienced delays in the allocation of their funds. As explained earlier, their business plan was based on buying the paddy rice quickly after harvest, so delays in the allocation of the credit was detrimental to their activities. Moreover, to avoid the fungibility of the credits, the funds lent to the mills were only to be used for the purchase of the contracted rice. When farmers failed to meet their delivery quantity commitments, mills found themselves with allocated but unused credit on which they had to pay interest. Overall, the distribution of credit was far from perfect. Important steps in the right direction were taken, but significant room for improvement remains (as proposed in 5.4).

### Farmer credit reimbursement

**The farmers’ rate of reimbursement improved considerably over the course of the project, driven both by greater reimbursement capacity and greater motivation to comply.** Much less than expected production in upland rice cultivation contributed to substantial credit default during the first year. About half of the loans were fully reimbursed in the 2020, to rise to virtually full reimbursement (97%) in 2021. Theoretically, the rate of reimbursement can be seen as driven by two key factors: 1) the borrower’s reimbursement capacity and 2) his willingness to reimburse.Rice yields are likely at the of a farmers’ capacity to reimburse, in addition to their income obtained from other sources (e.g. cash crops) and their overall wealth. To illustrate the importance of reimbursement capacity, a simple bivariate comparison suggests that whenever the ratio of the total value of production was twice the amount to be reimbursed (credit + credit cost), farmers fully reimbursed their credit.The interest in prolonged project participation as well as the experience with the pilot are likely factors affecting the willingness to comply with the reimbursement, controlling for one’s capacity to reimburse .[[84]](#footnote-85)

**Multivariate analysis confirms the critical importance of sufficiently high harvest values for farmer credit reimbursement (Table 12).** The importance of the value of total rice production, which depends on both the rice yields as well as the sales price, is confirmed when controlling for other factors such as household wealth, the size and cost structure of the credit, and other household and village characteristics. Those with a predicted reimbursement capacity greater than one[[85]](#footnote-86) are 75 percent more likely to fully reimburse (Table 12, col 1). Ceteris paribus, wealthier farmers were also more likely to reimburse, highlighting the role of alternative income sources.

**The cost structure of the loan also matters.** The amount of credit taken did not affect reimbursement, but the cost structure as captured by the ratio of the credit cost over the total credit, did. When the loans are small, i.e. when the contracted area is limited, the share of fixed costs for the credit can be substantial (see Table 10).[[86]](#footnote-87) This increases the cost of the credit, weighs on the profitability of the rice contract, and also reduces the rate of reimbursement. It was another reason why the Pilot increasingly insisted that participants contracted at least 0.25 ha of land or grouped land among themselves to reach at least 0.25 ha (the other reason being to reduce transaction costs for the MFI and the mill).

**Finally, cash transfer beneficiaries were systematically about 10 percent less likely to reimburse their loan** (Table 12, cols 2 and 3). This follows only partly from the lower capacity to reimburse. Controlling for the capacity to reimburse (Table 12, col 2) shows that they are still 9 percent less likely to reimburse, which may suggest a certain reluctance (entitlement) regarding their credit obligation.

Table 12 Factors affecting farmer credit reimbursement

|  |  |  |  |
| --- | --- | --- | --- |
|  | Marginal Effect | Marginal Effect | Marginal Effect |
|  | (1) | (2) | (3) |
| *Reimbursement capacity* |  |  |  |
| Reimbursement capacity (1 if total value harvest >=total amount to reimburse) | 0.75\*\*\* | - | - |
|  | (0.12) |  |  |
| log(reimbursement capacity ratio) | - | 0.08\*\*\* | - |
|  |  | (0.03) |  |
| Asset and housing index | 0.01 | 0.02\* | 0.02\*\* |
|  | (0.01) | (0.01) | (0.01) |
| Credit obtained (1000 FCFA) | 0.00\*\* | 0.00 | 0.00 |
|  | (0.00) | (0.00) | (0.00) |
| Ratio of cost of credit over total credit obtained | 0.56\*\* | 0.53\*\*\* | 0.52\*\* |
|  | (0.23) | (0.19) | (0.26) |
| Cash transfer recipient over the past 5 years  (1=yes; 0 otherwise) | -0.07 | -0.09\*\* | -0.14\*\*\* |
|  | (0.04) | (0.05) | (0.05) |
| *Reimbursement willingness* |  |  |  |
| Issue with the Inputs delivery (1=yes; 0 otherwise) | -0.10\* | -0.12\*\* | -0.10 |
|  | (0.06) | (0.06) | (0.07) |
| Confidence in the project (scale from 1 (vey low) to 10 (very high) | 0.01 | 0.01 | 0.01 |
|  | (0.01) | (0.01) | (0.01) |
| *Rice and market orientation* |  |  |  |
| Commercial rice grower (no cash crop)  (1=yes, 0 otherwise) | 0.07 | 0.05 | 0.17\*\* |
|  | (0.06) | (0.07) | (0.07) |
| Commercial cash crop grower  (1=yes; 0 otherwise) | 0.02 | 0.06 | 0.07 |
|  | (0.06) | (0.07) | (0.08) |
| Commercial farmer (rice & cash crop; 1=yes; 0 otherwise) | 0.02 | 0.05 | 0.13\*\* |
|  | (0.05) | (0.06) | (0.06) |
| Observations | 539 | 539 | 539 |

Note: Other control variables include gender of household headship, household size (adult equivalents), distance to the city). There are 4 groups for rice and market orientation (see section 3.3 for details). The omitted category are subsistence: farmers that don’t sell their rice and grow no cash crops; Commercial rice: farmers that grow rice for sale, but don’t grow cash crops; Commercial cash crop: farmers that grow cash crops, but don’t sell rice; Commercial farmers: farmers that grow rice and cash crop for sale. Asset index obtained as the first principal component from consumption durables and housing features; reimbursement capacity ratio equals the total value of the harvest divided by the total amount to be reimbursed (credit+ credit cost). Standard errors (in brackets) have been clustered at village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**For credit providers, knowing beforehand (at the start of the season) who will be more likely to reach the reimbursement capacity threshold is key.**  Factors associated with a higher likelihood of meeting the reimbursement capacity threshold of 1, include whether rice is transplanted or not, the size of land contracted, and agroecological weather patterns. The adoption of transplantation practices affects production, but could also be a sign of rice orientation as it requires extra time. Commercial rice orientation also mattered. To see this, note that commercially oriented rice growers (see the note below Table 12 for definitions) are 13-17 percent more likely to reimburse (Table 12, col 3). Yet, when controlling for the capacity to reimburse (Table 12, cols 1 and 2), the effect of rice and market orientation disappears (the size of the coefficients drops significantly, and the coefficients are no longer statistically significant). Put differently, the rice and commercial orientation affects the likelihood of reimbursement through their effect on the reimbursement capacity and not so much throug their effect on the willingness to reimburse. Developing refined credit scoring models, coupling reimbursement behavior to yield predictions based on information available before planting, is an important area for further development, currently also pursued by IFC in Côte d'Ivoire.

**In addition to the value of production, other factors, reflecting farmers’ incentives to reimburse, linked to their interest in future participation, also mattered.** Controlling for reimbursement capacity, households in villlages that experienced issues with input quality for example, were much less likely to reimburse, pointing to issues of trust and perceived responsibility of harvest failure (Table 12, col 2). We did however not find a statistically significant effect of commercial rice orientation on the willingness to reimburse, but cash transfer recipients did display a lower inclination to reimburse, controlling for their reimbursement capacity.

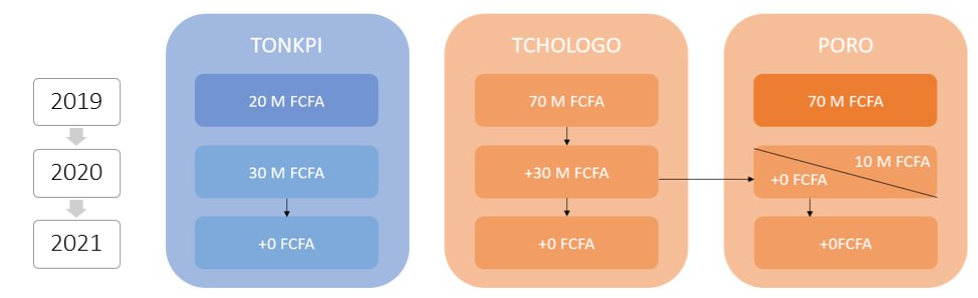
**In conclusion, there was a large improvement in the reimbursement of farmers’ credit, though cash transfer receiving households systematically underperformed by 10 pecentage points.**  Part of the improvement can be explained by the large improvement in rice yields, partly driven by larger commercial rice orientation of the participant, resulting in increased reimbursement capacity as well as better project implementation (timely and quality input delivery). This emphasizes the value of a stricter selection of farmers in aiming for a better rate of credit reimbursement. The systematically lower reimbursement rates of cash transfer receiving households (controlling for their reimbursement capacity) speaks against preferencing them in farmer selection. More details are in Barzola and Christiaensen (2023).

### Millers’ credit reimbursement

**Millers’ performance varied substantially over the years, resulting in quite a bit of churnover.** Facilitation by the pilot enabled the participating paddy miller to access credit from the financial institution for the purchase of paddy from contracted farmers with the sale of milled rice generating the revenue from which the credit could be repaid. The very small number of mills involved in the Pilot prevents any quantitative econometric analysis, but a qualitative assessment of the success and weaknesses of the Pilot intervention for the mills is possible. In Tonkpi, the short term, exploitative profit seeking orientation by the mill led to its replacement by another mill for he 2020 and 2021 agricultural seasons. And one of the mills in the other regions of the Pilot could not reimburse its 2019 credit following a shift of some of the funds to other uses. The mill was excluded from the Pilot (though obtained a loan restructuring). For 2020, the mill was replaced by another mill. In 2021, the mill serving the Tchologo region, also took on the participating villages in the Poro region, to increase volumes.

**Credits to the mills varied by region as a function of the expected amount of paddy delivery.** In Tonkpi, the amounts lent to the original and replacement mills were between 20M and 30M FCFA (Figure 5). In Tchologo and Poro, the 2019 mills both received a loan of 70M FCFA, which far exceeded the amount needed to purchase the volume of rice to be delivered under the contracts. Neither mill had reimbursed the total loan by 2020. For one mill, serving the Tchologo region,, the remaining amount got restructured into a new loan of 30 million. The other (serving the Poro region) was dropped from the program and a new mill was brought in which was given a loan of 10M FCFA, after which that mill was also replaced in 2021 by the mill serving the Tchologo region. All these mills were credit-constrained before association with the Pilot, and desired larger credits than provided, so as to be able to purchase supply outside of the Pilot’s farmer participants. The credit terms required a one-third repayment within three months of receiving the loan, and the pressure to finance this through sale of milled rice meant that mills had reduced latitude to hold stocks in anticipation of the usual seasonal price increase as time lapsed from the peak harvest season. By mid 2021, the mills had reimbursed about 50 percent of their loans, with about 114 million FCFA still to be reimbursed.

Figure 5 Evolution of the mills’ financing across years of implementation and per region[[87]](#footnote-88).



**This implementation experience allows identifying some elements that contributed to the success or the default of the participating mills.** First, the success of the mills depends on the farmers' performance and on their contractual commitment to deliver the agreed quantities of paddy. While the system was set up for the funds not to leave the bank’s accounts so that the farmers could be paid back directly by transferring the money to their accounts , in the absence of sufficient paddy, the mills were allowed to cash in to purchase paddy on the market, enabling some to use it for other purposes. Second, the enterprise strength of the mills is a useful anticipatory indicator of success: the business plan and the bookkeeping of the more successful mills participating in the Pilot were better developed when compared to others. Third, design of the credit product provided to the mills merits rethinking. A line of credit design that allows the mills to call on credit as farmers’ deliveries become concrete would mean the mills avoid paying interest on unused loan amounts. And a different repayment profile post-harvest could provide the mills with more scope for short term stock management so as to gain from post-harvest rice market price increases. Timely release of the credit is also key to facilitate timely payment of the farmers. Finally, were the Pilot to have made more progress facilitating the mills’ strategies for marketing improved rice to the domestic market, this may have entailed mills having contracts for delivery to this market which could serve as collateral for additional credit arrangements with financial intermediaries.

## Towards more effective credit provision

There are many lessons to be learned from the implementation of this type of financial scheme. It is clear that the pilot project encountered implementation problems that contributed to disappointing results, particularly in terms of reimbursement. In the final year of implementation, these problems were largely overcome at farmer level, resulting in a considerable improvement in the farmer reimbursement rate, though some of the mills remained saddled with substantial debts. Following guidelines for achieving improved allocation, distribution and reimbursement of its financial interventions emerge.

### Digitalization of the credit process

The perspective of digitalization of finance for developing agriculture appears as a way of reaching the objectives of the Pilot in terms of reaching new populations, reducing uncertainty and transaction costs and finally enabling a level-up of the financial system across all the stakeholders of the Rice Value Chain.

First, with minimal infrastructure, digitalization offers access to a large panel of services to excluded populations. Through mobile banking and digital platforms, farmers can access loans, savings accounts, insurance, and electronic payment systems. By facilitating inclusion of farmers into formal financial services, digital platforms allow them to better manage risks, control their reimbursements, and invest in their operations.

Second, according to the previously described transaction costs, digital payments enable secure and efficient transactions and facilitate the exchange of funds amongst farmers, suppliers, and buyers. Digital platforms eliminate many traditional administrative and operational costs associated with finance, such as paperwork, travel expenses, and manual record-keeping. Finally, digital platforms can provide rice farmers with real-time access to market information, including prices, demand trends, and market opportunities. This would allow a reduction of the uncertainties associated with the market evolutions.

### Confidence building

The functioning of the Pilot was based on collaborative behaviors, therefore another lesson learned from the program was the importance of building relationships of confidence amongst the stakeholders.

The intermediation of Pilot representatives and loan officers helped create this relationship of trust between participants and offset farmers' intrinsic incentives not to repay their loans and not to meet their contractual rice delivery obligations. In addition, between 2019 and 2020, the Pilot showed leniency to farmers who had attempted to fulfill their production commitments. This led to the inclusion of farmers who had not fully repaid their loans; but it also enabled the creation of a relationship of trust between the participants and the implementation teams.

Measures of the levels of confidence did indeed improve,with farmers becoming more trustful of the mills (average trust score increasing from 6.6 in 2020 to 8.2 in 2021) and the Pilot representative (average trust score increasing frm 7.8 in 2020 to 9.4 in 2021), even though the effects of this measure are not significant as predictors of reimbursement (ceteris paribus). Yet, as illustrated by the negative effect of the negative experience with the Pilot’s delivery of inputs on reimbursement rates (controlling for reimbursement capacity), taking responsibility matters for trust building and farmers’ willingness to comply with their engagement.

### Loan composition

The uses and structure of the loan play roles in its efficiencies both in terms of agricultural results and in terms of reimbursement. In terms of agricultural results, in retrospect greater flexibility in the use of credits to farmers for their acquisition of mechanized services – for land preparation and especially for threshing - could have provided a significant boost to rice production quantities and quality.

In terms of the financial composition of the loan, the introduction of a mandatory deposit of 10% of the value of the loan correlated with the better results presented in 2021. However, no causal link can be identified econometrically since the entire effect is captured by the year-fixed effect.

According to the literature on credit insurance, it seems important to include other financial products such as insurance to cover farmers, mills and the MFI for the risk of null production (beyond life insurance which was included).

# Institutions and Coordination

## Conceptual and National Contexts for Establishing Capacity for Value Chain Coordination

**Value chain institutional structures exist in different general forms to achieve a level of coordination that through collective action across stakeholders aims for better outcomes than each stakeholder could attain acting independently.** These outcomes vary and span

cost reduction, investment synchronization, risk reduction, innovation enhancement, and quality improvement. Collectively, they increase the value chain product(s)’s competitiveness, profitability, and potential for growth. For value chain stakeholders to organize cooperation around shared objectives, these need to be articulated along with responsibilities, agreement on an implementable plan of actions, and mechanisms for accountability amongst the partners.

**Designing and launching the Pilot occurred in the context of Côte d’Ivoire’s national supportive environment for the operationalization of value chain coordination, applicable across agricultural commodities.** This environment is regulated by a framework law, an interministerial decree and a presidential ordinance. [[88]](#footnote-89) These legal texts define the role of the State and actors in the promotion of agricultural value chains, the composition and objectives of value chain organizations (*interprofessions*), as well as the conditions for their creation and functioning (Box 1 ).

**At the time the Pilot was being designed (circa 2018), efforts were underway at the national level but still in a planning stage to create a rice value chain association (O*rganisation Interprofessionelle Riz* or OIA-Riz).** By the end of the Pilot in 2021 progress was made over the course of several constituent assemblies, and a governance structure elected (President, Board), but a formal launch of the OIA-Riz still not achieved for lack of identification of a financing mechanism for the agreed priority activities.

**In this context, the Pilot opted for a coordination model aiming to strengthen a “triangle of confidence” built on three poles: farmers – mills – credit institution.** The Pilot developed activities for coordination across these three which parallel those envisioned in the national regulatory framework for value chain organizations, albeit more informal and primarily at the local level. In a sense, the Pilot aimed to test a minimum viable ecosystem, and in the process, draw lessons pertinent to potential scaling up, or for implementation by the OIA-Riz of its plan of activities at a national level.

Box 1: The Enabling Environment for Agricultural Value Chain Coordination in Côte d’Ivoire.

The agricultural interprofessions (IA) have the following 7 characteristics in common:

1. Each of the main stakeholder groups is organized as a chamber, with its own members and its own internal governance, and they are generally created for: (i) farmers; (ii) processing companies (private and state-owned); (iii) Government. These chambers meet, agree on a strategy, develop annual work plans with identified financing mechanisms, and implement them to enable the realization of an annual budget.
2. The establishment of an administrative unit and capacity by the executing agency to facilitate the implementation of the strategy, annual work plans, and the execution of the budget decided by all the chambers of the interprofession.
3. Secondary participants in the value chain are generally considered service providers - for example, production inputs, financial services, transportation, and storage - and may be associated as observers but generally do not have voting rights in the IA and its annual meetings.
4. The executing agency, if it has adequate financial means, can also mobilize and manage a variety of value chain services through its administrative unit, such as extension and capacity-building technical assistance of collective interest, laboratory quality testing, market development, etc.
5. The legal status of the IA. This status is supported by national legislation on agricultural and commercial organizations and generally operates at the national level of operations with an organizational structure reaching the local level and that of farmer members. Coronel and Liagre (2006) and Zoma (2006) have identified the provision of a clear legal status as an essential characteristic of interprofessions.
6. The logic that characterizes them. This logic consists of selectively undertaking activities that require coordination and cooperation among the chambers of stakeholders. Each chamber can independently undertake activities that exclusively interest its members and have autonomous operational and budgetary responsibility for these activities.
7. The general observation is that IA has been more effective and sustainable for agricultural products that are largely export-oriented, cash crops (cotton, rubber, palm oil, coffee) than for staple food commodities. Two reasons for this could be that a reliable financing mechanism for IA is available for administration as a tax on export volumes, and the value chain processing segment tends to be more concentrated and professional, facilitating the internal governance of this chamber

## Coordination Roles Under the Pilot

The Pilot’s institutional structure was built around a number of core elements, with some modest modification of these over the three years of implementation.

National coordinator. Overall supervision of the pilot’s activities in its three regions, along with support to the three regional coordinators was the focus of the national coordinator, who was accountable to the World Bank team leader. Responsibilities also included overall management of data collection for monitoring and evaluation, and assurance of pilot reporting. Liaison with government actors and stakeholders in the rice value chain was an additional role.

Regional coordinators. One coordinator was recruited by the Pilot for each of the three Regions to provide administrative outreach and coordination on all the Pilot’s activities. The coordinators’ main tasks were supporting the coordination amongst the Pilot stakeholders through presence at all the key activities, assuring clarity of communications on and understanding of procedures, supervising activities to ensure they proceeded transparently and according to plan, especially respect of contractual agreements. In addition, they

assisted to resolve conflicts that might emerge within CIG and communicated upward to the National Coordinator on the status of Pilot activities at the regional level.

Over the course of the Pilot, some problematic aspects of implementation arose that required additional attention from the regional coordinators, with three in particular leading to adjustments in work plans. In the first year, farmers’ plot sizes were overestimated, leading to excessive input and related credit amounts, as well as contractual commitments to deliver paddy to the mill. Each of these overestimations contributed to underperformance by farmers, and the response in the subsequent two years was much more presence by regional coordinators in the villages with farm visits to ensure more realistic subscription of farmers’ intended plot size as the basis for related production and marketing commitments. Second, low-land plots varied considerably in the adequacy of their water management hence productive potential, and after the first implementation year, the regional coordinators used their greater village presence to assist the Pilot partners to avoid signing up farmers with poor quality lowlands. Third, the first Pilot year’s harvest was accompanied by an unsustainable level of farmer paddy deliveries, and as a consequence, under-reimbursement of input credits. Active participation by the regional coordinators and engagement with individual farmers sought to clarify obligations and rescheduling options so as to get improved performance on credit repayment.

Credit institution agents. The Pilot provided finance to the Credit Institution to hire a credit agent for each of the three Regions to facilitate the credit activities in support of participating farmers and milling units. The credit agents’ numerous functions included communicating the availability of credit to potential participants, establishing account dossier for participants, assessing rice input cost estimates by farmers, joining the Credit Institution’s credit provision decision on farmers’ and millers’ dossiers, observing the organized delivery of farmer rice to the milling units which provided the basis for farmer reimbursement of their input credit, and for millers’ reimbursement of commercial credit received from the Credit Institution.

The credit agents also managed information flows for Pilot implementation. Credit reimbursement non-performance was communicated both to the Credit Institution and Pilot coordinators for follow-up, along with regular monitoring reports. Credit agents’ functions were modified during Pilot implementation with regards rice input mobilization and farmer credit dossier management. Credit agents had the major responsibility at the outset of the Pilot for inputs – validation of farmers’ requests, aggregation, and financing the contract with input suppliers – but this ran into implementation difficulties on delivery timing and product quality. Based on this experience of the first two implementation years the Pilot changed the input procurement arrangements such that the credit agents no longer had a central role in selection of input suppliers and procurement, other than enabling the underpinning credit arrangements. Farmer credit dossier management at the outset of the Pilot required farmers to travel to the Credit Institution’s local branch office, and this proved burdensome to farmers and resulted in delays in credit approvals and input procurement, with the remedy that the credit agents were instructed by the final Pilot year to undertake the process of farmer credit dossier establishment in the villages.

Village-level Commercial Interest Group (CIG). The Pilot relied on, and provided capacity-building support to, informal rice farmer groups (CIG) as the vehicle for working with farmers, in the general absence of functioning rice farmer cooperatives in the Pilot regions. The CIG chose their members and President, and were relied upon by the Pilot for receiving and distributing input deliveries, organizing test plots to assure the germination quality of procured seed, agreeing on arrangements for demonstration plots for crop technology extension activities, organizing harvest aggregation for delivery to the miller, and facilitation of interaction with Pilot management and partners on communications, workshops, and data collection.

The Pilot also supported the establishment in each region of an inter-CIG, whose members were the Presidents of the village-level CIGs, who in turn elected one of their members to be inter-CIG President. The intent was that this inter-CIG would provide farmers with greater institutional weight in negotiating with input providers on price, with the Credit Institution on conditions of credit provision, and with the miller on price and other contract provisions.

The CIG and especially their Presidents were important in reducing the transaction costs of reaching and communicating with individual farmers. CIG and regional inter-CIG played a significant role in selection of inputs, aggregation of the purchase lots which helped on price and managing logistics of timely acquisition. Over the course of Pilot implementation, the CIG also beneficially increased their involvement in selection of participating farmers with farm parcels with appropriate soil and water control characteristics for rice production, and in the regional negotiations on input procurement.

The Pilot’s aim in capacity building with the CIG and regional inter-CIG was operational functionality and did not commit to move these farmer organizations to the more formal status that would make sense to target more downstream in the process of value chain strengthening. Formalizing the roles of President, Treasurer, and Secretary, and internal governance by-laws would make sense to pursue within a consistent policy and support context as may eventually be provided by the national OIA-Riz. The Pilot period, though, was characterized by considerable evolution in criteria for farmer participation, and consequently in CIG membership, and this contributed to the Pilot period being considered a premature stage for focusing on a level of institutional formalization that will, sequentially, become appropriate. In the interim, it is true that CIG farmer members’ confidence in their President was an underlying issue, with nearly 40 percent of members in the third Pilot year expressing lack of trust in their President, which correlated with lower extent of respect of delivery terms in their contracts with millers.

Production Officer of Mills. Under the Pilot, a technical officer was mobilized for each of the three regional mills whose activities and communications established an important point of contact between the mills and the farmers contracted to deliver rice to them. The Production Officer worked directly with farmers through their CIG, providing technical and commercial assistance, including field visits to check that farmers were following good agricultural practices, advising on harvest and post-harvest means to attain contracted quality levels, organizing farmers’ harvest aggregation for village delivery to mills, and communicating to the mills and Credit Agent each farmers’ deliveries as the basis for financial posting to credit and individual bank accounts.

For the first two years of the Pilot, the mills were required to cover the costs of the Production Officer, but because of general financial stress compounded by Pilot farmers’ shortfalls in delivering contracted quantities of paddy, the Production Officers’ costs were covered directly from the Pilot’s budget. The importance of Production Officers doing their job well and earning the trust of farmers with whom their mills had contracted emerges quite clearly from Pilot monitoring data. Regular village visits by Production Officers helped reinforce understanding of contract terms (quantity, quality, price), improve appropriate use of purchased inputs, and reduce side-selling.

Technical assistance provider (TAP). Technical assistance provision and administrative functions were provided by a firm contracted using the Pilot’s budget. The TAP provided technical support to all the institutional components of the Pilot, with a particular focus on the millers and CIGs. Continuous technical assistance accompaniment of the mills by the TAP focused on financial management, accounting and servicing of the credit received by the mills from the Credit Agency to finance paddy procurement under the contracts with farmers as well as equipment and process upgrades to mill a higher quality rice. Further, the TAP facilitated the establishment of an extension plan through which farmers were provided with support on improved techniques of rice production, harvesting, and storage. Also, in support of coordination, the TAP also established a range of documents and protocols for Pilot administration as well as studies on rice production economics in the Pilot regions that underpinned adjustments in farmer targeting criteria. The organization of meetings and stakeholder workshops at regional and Pilot-wide levels was also assured by the TAP.

## Coordination Activities Under the Pilot

**The coordination challenge of the Pilot was to synchronize the interests and capacities of the key stakeholders – farmers, millers and credit provider – on agreed objectives the attainment of which required cooperation.** Coordination activities occurred formally through annual Pilot-wide workshops and informally through meetings as needed at the Pilot’s region and village levels. Coordination on key elements of transactions, particularly of paddy sales, was formalized via individual contracts between individual farmers and the millers.

### Coordination Activities

Coordination activities were catalyzed and animated by, and financed through, the WB-hired national and regional coordinators, with administrative support of the technical assistance provider (TAP).

All stakeholders from the pilot value chain were represented in the annual workshops, in which other partners in the rice sector such as ADERIZ and the Ministry of Agriculture also participated.

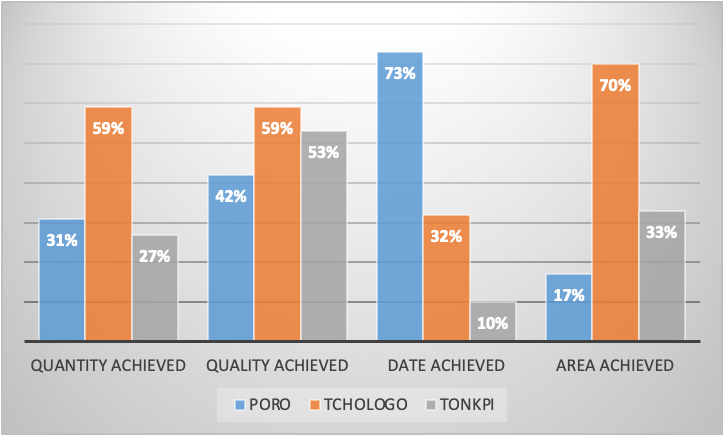
The first annual workshop served to inform, mobilize and gain adherence of Pilot participants, and to organize and launch the activities of the first crop season. The subsequent annual workshops took stock of the preceding crop season and drew on lessons learned to decide on modifications for the coming crop season. These were each time informed by analysis of the administrative and survey data collected throughout the course of the year.

A challenge that underlay coordination activities arose from the informality of the CIG and the UTs. For example, valuable coordination opportunities amongst farmers emerged around the acquisition of mechanized services such as for land preparation and threshing of paddy. Effective mobilization of and use of equipment for these production activities proves often to be easier for farmers acting in concert, and CIG would be well placed for this. But arranging contracts with commercial mechanized service providers and mobilizing credit to facilitate the activities’ finance can prove difficult for a CIG with only informal legal status. A legal status is also need for credit acquisition.

### Contract for Paddy Sales design and compliance

**The coordination of farmers’ and millers’ interests at the interface of the commercial transaction between them was formalized in a contract** that was signed each season of the Pilot between individual farmers and the millers. The design of the contract expresses the aspects of this transaction of mutual interest. The contract’s design, or clauses, remained unmodified over the Pilot’s three years, and covered six aspects of the transaction: rice variety, quantity, quality (moisture, impurities, fermented grain), price, delivery date, and the farmer’s contracted area.[[89]](#footnote-90) Farmer performance on the contract’s clauses in the final year of the Pilot are shown in Figure 6.

Figure 6 Fulfillment of contract terms, 2021, by Region



Source: Pilot administrative data.

N.B. Rice variety and price are not shown since fulfillment was complete.

**These rates of fulfillment in the 2021 season represent an improvement over the previous two years of the Pilot, yet clearly leave room for improvement** in the use of formal contract as a coordination instrument and mechanism for building trust between farmers and millers. Explicit contract enforcement was not available nor perhaps appropriate in the Pilot’s environment, but activities were undertaken in Pilot administration, particularly by the Regional Coordinators, to improve understanding of the contract for farmers deciding to participate, and to deepen comprehension amongst parties of the longer-term gains from contract fulfillment. Also, as the Pilot progressed, more care was taken at the season’s outset, to improve accuracy of farmers’ area commitment, estimates of home consumption, and relation to delivery commitment, so that the latter would be fulfilled.

**To identify opportunities for further improvement of contract fulfillment, econometric estimation was done of possible explanatory factors on observed performance levels for 2021**. Variables with a positive relation to better contract fulfillment are household size (dependency ratio), age of the producer, extent of parcel water control, amount of agricultural equipment owned, or presence of agricultural service provider, and expressed farmer trust in their miller. Farmers with older children got their help with some rice production activities which benefited area and yield outcomes. Older farmers appeared to apply their experience in particular to get better outcomes on quality delivered to the millers. Better water control for the parcels dedicated to rice production for the contract commitments resulted in lower production risks, and greater and more predictable output for contract delivery. Farmer ownership of agricultural equipment (e.g. tillers, threshers), or access to providers of services for land preparation and harvesting, facilitate timely undertaking of these production operations, better yields, and improved harvest quality, and thus ability to comply with contract terms.

**Factors that were negatively correlated with contract fulfillment were a farmer’s extent of production of other cash crops (e.g. cotton, coffee, cacao), exposure to multiple buyers in the area, and education level.** Other cash crops’ harvest time came during the same period as for rice hence competed for farm labor, resulting in a delay in paddy harvesting, a deterioration in quality, and late delivery to the miller. The presence of other rice buyers could tempt farmers to opt for better prices, e.g. side-selling. The educational impact may be that higher levels resulted in farmers being more ready to speculate on price and timing opportunities available in the general markets in comparison to the contract specification.

**This Pilot evidence on factors bearing on contract fulfillment suggests three types of actions that could result in better performance on contracts for rice delivery in the value chain**. First, millers could use the characteristics above that are positively and negatively correlated with contract performance as filters when expanding their contractual relations with supplying farmers. Second, consideration could be given to inclusion of a more sophisticated price clause of the contract that introduces a mechanism for adjustment to reflect market price trends between planting and harvesting periods, so as to reduce incentives for farmers to side sell. And third, public sector support could be designed to expand access to mechanization for rice land preparation and crop threshing, whether as credit to farmers or farmer groups, or to commercial service providers of these production activities.

### Managing cost-for-value within the Pilot’s coordination mechanisms

**Experience gained through the Pilot in managing various components of deployed coordination mechanisms provides some scope for mixed quantitative/qualitative assessment of cost-for-value of these mechanisms**. Lessons that can be drawn from such assessment is of use in extrapolating from the Pilot to implications for larger-scale establishment of rice value chain cooperation amongst stakeholders. In particular, assessment of coordination costs in value chain development during the Pilot aimed to identify opportunities for cost reduction measures and modalities that could be applied to achieve these. Two technical assistance and two coordination activities are examined next.

Provision of agronomic support to rice farmers. The Pilot financed agronomic extension activities to benefit participating farmers, initially in just one region (Tonkpi) the first year then subsequently extending to reach all farmers. Extension agents and supervisory staff were engaged sufficient to attain a farmer-agent ratio that ranged between 39-51 over the three implementation years. Extension activities comprised both demonstrations through field schools and visits to individual farmers’ plots and occurred over four months for each season. Results for participants can be compared with those for non-participants.

Direct costs [approximately 3,6 million FCFA for 3 regions in 2021] of the extension activities include both the extension staff salary, mobility, and communications expenditures, and the village demonstration plot costs of land, labor, and inputs. Techniques demonstrated involved greater labor inputs (transplanting seedlings in line rather than broadcast seeding), but with the benefit of lower seed quantity requirements, and lower harvest and post-harvest losses through the improved practice of harvesting at 80% maturity of grains. Overall, the benefits of the advised improved practices were higher yields and better quality. Results in the final Pilot year show that participating farmers[[90]](#footnote-91) achieved 400 kg/ha higher yields, while saving FCFA 5087/ha through lower seed quantities used, compared with non-participating farmers.

Provision of technical assistance to the mills. Amongst a range of capacities on which technical assistance was provided to the mills was the mobilization of a production officer to serve as a liaison between the mills and contract farmers. For the mills, supporting the cost of this additional staff would be offset by better productivity of contracted farmers and contractual performance on quantities, quality, and timeliness of paddy delivered to the mills. In practice, covering the cost of the production officers posed a problem for the mills, and this cost reverted back to the Pilot in the third year of implementation. The following analysis of costs and impacts provides insights on a path to sustainability of the coordination function provided by the production officers (Table 10).

Measured in cost per unit of paddy delivered under contract to the mills, the production officers on average cost the mills 29.7 FCFA/kg, with a range of 29—35.5 FCFA/kg over the Pilot region’s three mills. These costs occurred in a context of:

The contract purchase price from farmers averaged 150 FCFA/kg;

Delivery costs – aggregation sacking, transport – came to 20 FCFA/kg;

Milling and packaging costs averaged 13 FCFA/kg; and

Milled rice/paddy transformation rates were approximately 65%.

This cost structure implies that the break-even price for milled rice averaged 343.2 FCFA/kg for the Pilot’s three mills (330-357 FCFA/kg range), with the production officer cost representing a 13% share of this cost structure. As a fixed cost, the avenue for reducing the financial burden of having a production officer to provide coordination services is to augment the quantities of paddy delivered to mills from contract farmers, in turn linked to yields that farmers achieve.

Table Production Officer Cost Analysis by Mill, Year 3

|  |  |  |  |
| --- | --- | --- | --- |
| Structure of costs | Mill/Region | | |
| **Poro** | **Tchologo** | **Tonkpi** |
| Quantity of paddy delivered (kg) (a) | 40400 | 50000 | 33800 |
| Annual Cost of Production Officer (FCFA) (b) | 1200000 | 1200000 | 1200000 |
| Remuneration of Production Officer per KG of paddy delivered (FCFA/kg) ( c= b/a) | 29.7 | 24 | 35.5 |
| Paddy purchase price (F/kg) (d) | 150 | 150 | 150 |
| Costs of aggregation, handling, transport, per kg paddy delivered (FCFA/kg) ( e ) | 20 | 20 | 20 |
| Break-even paddy price (F/kg) (f = c + d + e ) | 199.70297 | 194 | 205.503 |
| Price equivalent in milled rice (F/kg) (g) (g = f/0,65) | 307.2 | 298.5 | 316.2 |
| Milling cost for 100 kg white rice + wholesale packaging (h) | 1300 | 1300 | 1300 |
| Milling cost for 1 kg white rice + retail packaging (i) | 13 | 13 | 13 |
| Break-even white rice price (F/kg) (j = g + i ) | 320.2 | 311.5 | 329.2 |
| Production Officer cost as share of Break-even white rice price (%) | 9% | 8% | 11% |

Source: Calculations by Pilot team based on interviews with millers

Given the critical function that the production officers play in the Pilot’s strategy for strengthening the rice supply chain, it is important to find ways to improve the economics of mobilizing them, and their affordability for the mills. One avenue is through the criteria for selection of farmers, to focus on those able to commit to larger plots (say at least 0.5 ha) and with greater orientation to sales compared with home consumption, as well as through greater participation rates per village. It is estimated that the mills begin to find contract milling profitable once the mill’s liaison officers’ scope of work results in 400 tones of paddy delivered. Attempts to reduce the mill’s liaison officer’s costs of transport and communication were counter-productive since it corresponded with a deterioration in farmer performance on contract quantities and quality.

Cost management in credit provision. The Pilot budget covered the costs related to the credit institution’s seasonally hiring (six months) a credit agent for each region along with some elements of their operational costs. The interest rate paid by farmers was not otherwise subsidized. The Pilot budget outlay by season for the credit agent costs was 5.7 million FCFA. In reality, the credit agents devote two months to Pilot activities, with the other four months financed effectively serving other functions in the credit institution. Based on this assumption of about one-third of their cost to the Pilot being on activities of direct benefit to the Pilot, the following analysis is possible (Table 11):

Table Credit agent costs

| Annual costs of the credit agents | Season 1 | Season 2 | Season 3 |
| --- | --- | --- | --- |
| Direct agent costs (salary + communication + internet + fuel + motorcycle maintenance) (million FCFA) (a) | 1710000 | 1710000 | 1710000 |
| Office supplies (b) | 60000 | 60000 | 60000 |
| Office equipment amortization (c) | 60000 | 60000 | 60000 |
| Overheads (7%) (d= (a + b + c)\*7%) | 128100 | 128100 | 128100 |
| Total cost (FCFA) (e= a + b + c + d) | 1958100 | 1958100 | 1958100 |
| Direct costs, share of total costs (f=a/e) | 87,3% | 87,3% | 87,3% |
| Cost of credit (FCFA) (g) | 3,119,243 | 3,300,613 | 2415843 |
| Difference (receipts – cost) (h= g - e) | 1161143 | 1342513 | 457743 |
| Area (ha) (i) | 251,3 | 267,2 | 101,3 |
| Receipts per ha (FCFA/ha) (j= g/i) | 12413 | 12353 | 23849 |

Source: Calculations by Pilot team, based on Pilot implementation monitoring data.

N.B. Credit agent remuneration =5700000\*30% = 1710000 for the 3 agents, by year.

The total cost for three credit agents for a crop season comes to 1,958,100 FCFA, with about 87% of this covered by Pilot financing that was provided to the credit institution. On the other side of the ledger, the estimated cost of credit (interest earned?) reached a range of 2.4-3.1 million FCFA across the three years of implementation. This is sufficient to cover the costs of the coordination activities of the credit agents, enabling sustainable auto-financing by the credit institution, if the credit reimbursement performance by the farmers does not deteriorate.

## Extrapolating from the Pilot’s coordination experience to a scaled-up future

**The Pilot’s experience with institutional coordination structures and activities offers insights on scale-up opportunities for the rice value chain in Côte d’Ivoire.** For such scale-up to be sustainable, the financing of coordination activities would need to transfer from the external World Bank funding of the pilot to other sources. Indeed, such funding is the central constraint holding back the establishment of multi-stakeholder management collaboration of rice value chain development at the national level. Lack of agreement on how to establish a sustainable revenue stream (membership fees, self-taxation, …) has prevented the OIA-Riz becoming operational. While the Pilot did not test revenue mobilization options for financing coordination amongst stakeholders in undertaking a collectively agreed set of actions, it does shed light on the most important amongst the coordination activities and where cost management of such activities is most pertinent to sustainability. That is, the Pilot demonstrates a number of key areas in which institutional arrangements can be engineered so as to enhance desirable outcomes at manageable costs.

### Self-organization of the private sector - coordination

**Mills. The mill’s farmer liaison officers are essential intermediaries between the millers and the farmers, but their cost as a personnel expense to the millers needed to be covered by improved paddy supply and quality**. Maintaining the production adds an internal cost to the millers, while undertaking their important coordination function with contract farmers, hinges on increasing the volumes and quality of rice that are delivered under contract to the mills. Some balance amongst two options for getting such increases needs to be pursued. First is to achieve greater productivity amongst existing contract farmers and transforming this into greater commercialization quantities of milled rice. There does appear scope for further yield increases by participating farmers, as technique improvements were still being absorbed in the final Pilot implementation year. Second, millers could modify their criteria for outreach to farmers and villages with whom to contract, and upscale to larger farmers, more concentrated groupings of farmers, and farmers with better access to plots with adequate water control for rice production. Such targeting would likely make mill-farmer coordination on paddy delivery more efficient and enable greater delivery volumes per production officer, although moving away from the Pilot’s initial aim of bringing smaller, subsistence farmers into value chain production of improved rice quantity and quality.

**Credit union. The credit agent outreach activities to farmers in the Pilot appear to pay their own way on the credit business generated as long as default risks were contained**. Modifications introduced such as shifting the credit agents’ work to establish farmers’ credit dossiers by going to the village level rather than require farmers to come to the branch office and adding a requirement of a 10% farmer guarantee payment on the credit, improved performance within the financial flow schema of the Pilot for credit repayment. Integrating the credit agents more fully into the Credit Institution’s financial product offerings and broader commercial outreach to farmers, would spread the overhead costs of the credit agents and make their activities on farm working capital credits more affordable.

**Farmers. The farmer regional level inter-CIG fulfilled the important coordination function amongst farmer stakeholders of aggregating demand for rice production inputs and arranging and managing the contracts with input suppliers.** The costs borne by the farmer representatives in undertaking this work warrant being compensated within the farmer stakeholder group, as could be envisioned through a CIG membership fee or a modest input contract administrative mark-up.

### Role of the public sector – coordination/public goods

**The Pilot’s local (and national) coordinators undertook activities that were essential to the coordination of activities across the value chain stakeholders.** However, since these were not directly linked to a commercial transaction such as input purchasing, credit granting, or paddy delivery contract, they remain essentially administrative in nature, and the cost of their mobilization would need to be covered within the administrative capacity and budget of an eventual rice value chain organization.

**The Pilot demonstrated that there is an important role for the public sector to** play in nurturing a supportive commercial environment within which the rice value chain operates, and that contributes to improved outcomes. Examples are public sector support programs for small- and medium-scale enterprises that provide ancillary farm production services (contract plowing, threshing) that contribute to farmer productivity and product quality, public investment in support of irrigation, public funding for core extension provision, and interventions for conflict resolution.

### Incentive compatible contract design

Lessons emerged from the Pilot on contractual arrangements as a formal specification of coordination agreements between mills and farmers. The Pilot revealed several areas in which interests across stakeholders may diverge in the future sufficiently to potentially prove detrimental to coordination within the value chain unless additional mechanisms are introduced beyond those examined by the Pilot. Two such areas stand out:

* Contract delivery price for farmers’ paddy to the mill. There is a 4-to-5-month period between the agreement on price pre-planting to the time farmers’ deliver their paddy to the mill, and if market prices rise substantially over this period there is the risk that farmers will side sell and not deliver the contracted amounts. A more elaborate price specification could be envisioned for the contract that allows for some adjustment to a base price to reflect changes by the time of harvest and delivery. Establishing such a price adjustment mechanism for contractual purposes isn’t simple, needs to be transparent, and be based on an unbiased benchmark market price. For these reasons, it may be best foreseen as an option for development under an eventual OIA-Riz.
* Farmer receipt of a price premium for contract delivery on paddy quality. Independence of quality testing may need to be arranged, given the divergent interests of the farmers and millers in the testing process. Availability of instrument-based testing at the aggregation points where paddy is transferred from farmer to miller is an aid to transparency and reduces disputes. The need for such testing protocols, and for managing to minimize the costs entailed, are best decided by common agreement between farmer and mill representatives.

# Inclusive value chain development – Way forward

Building on the previous sections’ reporting on the purposes, accomplishments, and shortcomings experienced over the three years of Pilot implementation, this section reflects on general lessons that can be drawn regarding the pursuit of inclusive agricultural value chain development. It will mostly hew closely to the experience gained on the rice value chain. Three main trade-offs will be examined: between equity and efficiency in targeting and outcomes; between core complementarity and complexity in intervention scope; and between the internalized or external configuration of incidence of costs and other incentives bearing on value chain participants. Next, the section will highlight needed focus areas to build sustainability and scale beyond what was partially achieved over the Pilot’s three years. Finally, the section will close with brief extrapolation of Pilot learnings that may apply beyond rice to the development of other agricultural commodity value chains as well as for studying value chains more broadly.

## Trade-offs in design

### Equity-Efficiency

**The Pilot’s main grappling with the equity-efficiency tradeoff was in the targeting approach for farmer participants, and only to a lesser extent on mill enterprise scale.** For farmers, at the outset of the pilot, the aim was to target cash transfer receiving and poor subsistence rice farmers who are on the threshold of marketing a portion of their paddy production to help them leverage their cash transfers into the development of more remunerative activities. Initially, the quality of farmers’ available land was not a major consideration, and encompassed upland rainfed parcels, wetlands, and parcels with water control. In subsequent cycles, this proved problematic because farmers using parcels with lower water control had lower yields, lower marketed output, and more credit repayment constraints, with negative downstream impacts on the mills and the credit institution. Farmer selection criteria were progressively tightened in the second and third implementation years, both on parcel water management characteristics and on credit co-payment requirements.

**The operational calibration of the equity-efficiency balance was shown to operate on a number of dimensions.** On the dimension of water control, it proved important for farmers to have a minimum of water control to succeed with technology-based productivity increases, and so farmers with only upland rainfed parcels dropped out of eligibility. However, there was still a substantial range of parcel size across farmers continuing to participate, including farmers meeting the initial aim of reaching subsistence farmers on the threshold of market participation. On the dimension of credit, the Pilot progressively tightened farmer eligibility criteria, first by not continuing for a new cycle with farmers who had yet to clear their debt from the last cycle, and then by requiring an up-front co-payment for access to credit. This narrowed inclusiveness for farmers, since it made it more difficult for farmers with precarious cash generation, linked to lower marketable paddy surplus production, to envision participating in the Pilot activities. Finally, on the dimension of marketing, the contractual delivery of marketable surplus by farmers to the mill was a Pilot aim, though farmers were able to participate at quite low quantities of delivered paddy. It might be expected that mills (and the financial institution), with an interest in efficient supply (and reduced credit issuance costs), would prefer to meet their paddy procurement targets by working with a smaller number of farmers each supplying greater quantities, in a more limited number of villages, rather than a greater number of farmers spread across many vilages delivering smaller amounts each.

**On each of these three dimensions, the equity-efficiency outcome is a dynamic balance**, influenced by such factors as farmers pace of technology adoption, efficiencies dependent on levels of trust between farmers and millers, and financial relation deepening between borrowers and financial service providers.

### Complementarity-Complexity

**Agricultural commodity value chain strengthening interventions face the decision of how many aspects to tackle at the same time.** Encompass too many discrete stakeholder groups from the outset and the coordination complexity across often competing stakeholder group interests becomes overwhelming. Start by addressing too simple a set of value chain components and the risks escalate that a critical element to value chain functioning is not included.

**The scope and timing challenges are to identify the minimally viable ecosystem to target with activities of capacity building and to sequence interventions to expand this ecosystem as experience is gained**. The point of entry for this Pilot was the market opportunity: how to supply the domestic market’s unmet demand for improved quality milled rice through expansion of economically viable small-scale farmer production. In this market perspective, there are core complementarities of interest from mills to farmers and financial institutions, to increase quantities and quality of rice moving through the value chain. Alleviating finance constraints, essential to both farmers using different technology packages to improve production, and mills procuring paddy into a quality-branding rice marketing strategy, meant integrating a finance component for viability. Micro finance institutions on the other hand saw important opportunities within agri-business to expand their clientele with savings (from rice commercialization) and loan products (e.g., for education).

**Examples of the Pilot’s simplifying the starting point for stakeholder collaboration are contractual pricing and risk management**. The contract between the mills and farmers for delivery of paddy specified a fixed price (by quality) at the planting season for immediate post-harvest delivery. There was no adjustment to the contract price if the market price moved in the subsequent months to harvest. This exposed both farmers and mills to unfavorable price movements and potential degradation of value chain relations, for instance if farmers responded to rising-price markets by side-selling and not honoring their contractual quantity obligations to the mill. Regarding risk management, there was no investment in water control or crop insurance paired with credit to farmers to protect the financial institution from defaults linked to weather related crop failure. Additional mechanisms to deal with these price and production risk aspects would have made Pilot implementation more complex, and while this would warrant being considered to include for future sustainability, they were not limiting factors to reasonable outcomes over the Pilot’s original time frame. Close consultation and consensus building among the different stakeholders on the initial package fosters shared responsibility and sustainability in case the choices turn out to be too limiting or wrong-headed.

**To be clear, a minimally viable platform for collaboration around a shared objective will need to be ready to be adaptive.** Administration of the endeavor must be resilient, problem-solving, and guided by ground-up monitoring information and listening to stakeholders. Holding rigidly to an initial design for value chain strengthening is destined for failure. The design needs to have a robust, evidence-based, capacity for monitoring, assessment, stakeholder consultation, and adjustment. Adaptive flexibility in design challenges RCT type analysis, however, as the object of study continuously changes, making it harder to identify what exactly has been evaluated.

### Public or Private Absorption of Costs of Value Chain Development

**Catalyzing activities aiming to strengthen a commodity value chain such as rice entails costs being borne for the activities to come about. Such costs can be borne amongst the private sector partners or by the public sector** if the latter takes a leadership role, especially in the early stages during which trust and coordination mechanisms are being built. How and by which partners the costs are internalized of value chain development activities can occur in various configurations. In this rice Pilot instance, where the impetus for change to the value chain came from the public sector, the design of interventions to incentivize prospective participants could have taken three forms: production subsidies, provision for costs of capacity building and coordination, and assumption of some portion of the costs risk management.

*Production Subsidies*

The rice Pilot design explicitly avoided use of production input subsidies, and opted instead to have participants face market prices, most importantly for seeds, fertilizer and credit. This was chosen in the optic of downstream sustainability, both of participants’ willingness to engage, fiscal sustainability, and for demonstrating the viability of new production technology being deployed at market prices. In this, sustainability trumped short term equity concerns. Given the widespread use of purchased inputs across other crops, learning needs, a key justification for subsidization, were not considered a major constraint.

The Pilot did tinker with procurement mechanisms that enabled lowering the costs to participating farmers, such as through demand aggregation to larger procurement lots for inputs which attracted better offer prices, but there was no direct subsidization by the Pilot of inputs. Though a learning process was evident, by the third year of the Pilot, participating farmers seemed to be finding their way financially since mostly able from increased production to cover repayment of input costs.

*Capacity Building and Coordination*

Costs of capacity building and coordination activities amongst Pilot participants were borne almost entirely as a public charge (with World Bank-mobilized finance). Because of the incipient status of the national rice value chain *inter-profession* there were no readily available mechanisms for mobilizing the finance for these activities within the *inter-profession* itself. Thus, the costs of personnel, coordination activities, information system deployment, and capacity building undertakings to the benefit of farmers and millers, were financed from external sources.

Under the eventual context of a fully functioning rice *inter-profession*, the administration and costs of these activities would be borne by the *inter-profession* and at least partly financed by its members. Over the course of the pilot, a number of opportunities were identified for reducing the costs of these activities, as reviewed in Chapter 6, and the sustainability implications of these are summarized below.

*Risk Management*

Various types of risk inherent in the activities undertaken by participants in the Pilot could be managed through a mix of formal risk insurance and more informal risk reduction strategies. Crop insurance could in principle be deployed to protect farmers from needing to pay back credit taken to purchase production inputs even if bad weather of pests caused harvest loss.[[91]](#footnote-92) In the third year of the Pilot, the risk of non-repayment of credit by farmers was directly addressed and internalized by requiring a 10 percent down payment by farmers as part of receiving credit. Additional risk management could have become available and internalizable by the credit institution by expanding service relationship with farmers to include savings, deposits, and credits for other activities, but these did not emerge over the short timeframe of the Pilot.

More informally, mills could mitigate against the risks of higher costs entailed in engaging with many smaller farmers for sourcing the paddy supply for their milling activity, by aiming to work with fewer and more geographically concentrated farmers. For both formal risk management via insurance instruments, and informal management through deployment of operational mechanism, costs in initial roll-out stages could be partially subsidized on the public budget rather than be fully borne by the private sector participants. Risk sharing arrangements between partners (including the input providers whose markets were being developed) could be further developed as well as the provision of a partial credit guarantee by the public sector, a key requirement for scaling by the credit provider. For the Pilot, no formal insurance instruments were deployed so no subsidy was involved, while regarding informal mechanisms, the Pilot financed some coordination costs that went towards risk management particularly arising from relations amongst partners that were still building the basic foundations of trust. Public infrastructure investments in better water control of the lowlands would be an important additional insurance against production risks, which fell outside the scope of the pilot.

## Sustainability and Scaling

**A number of elements to build on for sustainability and scaling emerge.** Through three years of implementation, the rice Pilot achieved important positive outcomes. These were bolstered by mid-course adjustments, but had yet to firmly root self-sustaining value chain coordination on improved practices amongst Pilot partners. The positive outcomes achieved do point the way though towards the key elements that would build towards sustainability and scale. They were reached through choices on technology, organization, economic instruments and strategic sequencing.

**On technology, significantly improved harvest yields and farmer net revenues were achieved using improved seed varieties and fertilizer, bolstered by credit to enable input acquisition and agronomic advice**, and attended over the three years by progressive improvement to solid credit reimbursement rates. The technology dimension included a sharpening of farmer targeting criteria, especially focusing on a minimum level of water control for farmers to handle the risks associated with higher cash requirements for inputs and mechanized services (especially of harvest threshing, but also land preparation). The introduction of the upfront 10 percent credit downpayment introduced in the third year of the Pilot provided a powerful mechanism for incentive compatibility and contract compliance, with committed farmers more likely to selfselect and comply with the rice delivery and reimbursement terms of the contract. Substantial investment in extension and farmer accompaniment proved key. Increasing access to mechanization services will be an important next step.

**On organization, the Pilot’s organizational architecture anchored around locally based project liaison agents and supported by data collection and analysis to improve cooperation and coordination across value chain partners proved indispensable and effective.** It was able to assess results and costs and identify opportunities for cost reduction without unduly compromising coordination outcomes. Avenues of cost reduction in coordination activities are available. Coordination costs also come down automatically as the procedures consolidate, value added at village level is demonstrated, and more villages and farmers per village join, driving down the administrative cost per unit for the mills, the credit institution and the Pilot coordination. The organizational approach also made headway over the Pilot implementation on improving trust amongst the participants, as evidenced by improving farmer credit repayment rates, and improved compliance with contract terms between mills and farmers. Having the mills be responsible for the hiring and management of agents who managed the relationship with farmers towards getting the quantity and quality of production enabling contract fulfillment was a winning formula and could be extended to identifying additional villages and farmers to bring into a relationship with mills. Finally, the Pilot’s investment in farmer organization at the village level (GIC) as well as Region (inter-GIC) paid dividends in aggregating and consolidating farmers’ voices, bringing this to bear on improved prices and quality of acquired inputs, and in facilitating interaction with the other partners of the value chain, even if the level of institutional informality that prevailed during the Pilot would eventually merit addressing through strengthening of internal GIC governance norms.

**Introduction of a contract between individual farmers and mills was the core economic instrument brought by the Pilot into the rice value chain to improve coordination and predictability on higher quantities and better quality**. Contract performance improved over the three years and the price premium for improved paddy quality was incentivizing farmers, illustrating the importance of continued experimentation with contract design. Accompanying measures also proved to be important, particularly improving farmers' access to mechanized harvest threshing, which facilitated delivery on quality terms of the contracts. Further investment in developing the machinery service value chains (for both land preparation and threshing) in the region to increase their availability will be key for scaling, as will be support to further develop the GICs to better access these mechanization services by synchronizing planting and harvesting to aggregate demand.

**The Pilot’s orientation on strategic sequencing appears to be validated by implementation experience**. Priority from the outset was put on profitable on-farm productivity improvement and became the core focus. This was essential to produce the value-added lubricant essential as motivation to the participants to commit the additional efforts needed to gain other efficiencies up in the value chain (including participation density, volume and quality). Subsequent efforts will need to build on this for scaling including by increasing participation at village level. Inclusion should follow either directly, by pulling in new, less advanced farmers through demonstration effect or indirectly, through the labor market, by creating demand for on farm laborers as well as off-farm employment generation as incomes increase.

**Nonetheless, several challenges remain. First, the costs of technical assistance and capacity building provided to the mills on an individual basis are unlikely to be sufficiently compressible to be scalable**; shifting to a small business incubator model where support is more wholesale than retail, and perhaps provided anchored in a business association, may have better prospects. This is akin to the training-the-trainer model in agricultural extension which the Pilot moved to by the third year and has proven to yield good results elsewhere.[[92]](#footnote-93)

**Second, overall stakeholder coordination costs remained high with no solution apparent within the Pilot’s framework.** An important aspect of coordination in value chains is stakeholder negotiation and establishment of shared objectives and then squaring this with available budget (and human) resources and agreement on a work and expenditure plan. This dimension of value chain stakeholder coordination was only minimally navigated during the Pilot since the finance for the activities was mobilized externally (grant funding) by the World Bank, and the Pilot coordination structures did not provide the value chain stakeholders with authority over budget allocation and expenditure monitoring. By the closing of the Pilot’s activities in 2022, there was no post-pilot administrative or financing mechanism in place, either at region or national levels, to which to pass the baton of responsibility for supporting activities for continued value chain strengthening. Despite progress with structuring the national inter-profession (OIA-Riz), this had yet to identify a financing source and governance mechanism that would enable it to absorb the functions of the Pilot’s WB-financed coordination activities.

**Third, the three millers of the Pilot’s regions were not yet implementing marketing strategies sufficient to insert them into the improved (semi-luxe) segment of the domestic rice market** with the higher prices that such marketing progress would make accessible. Not until there are demonstrated and proven pathways for millers to reliably sell an improved product into this market segment will there be higher prices passed down sustainably to farmers through contractual terms.

**Fourth, contractualization needs further maturation beyond the accomplishments under the Pilot.** The focus on building trust between farmers, the mills and the financial institution must continue. The contract terms on quality need further strengthening such as improving transparency on quality and its determination, and on the specification and delivery on the quality-related price premium. To guard against side selling, there may also need to be investment in designing a pricing formula that allows for adjustment to the delivery price of paddy in the event of market price changes between planting and harvest/delivery. While it was fortuitous during Pilot implementation that prices set at contract agreement (planting) and available in the market at harvest time did not diverge so much as to provoke a side-selling problem, such risk should not be neglected. Further, timeliness in credit provision at reduced transaction costs could still be improved, with the digitalization of financial services holding great promise in this regard.

**Fifth, overall, establishing iVCD calls for long-term public sector involvement.** Establishing profitability at farm level is the starting point, including to establish profitability amond the other stakeholders. Yet, sustained public sector effort in terms of research, extension and water control is key. Partial credit guarantees may also be necessary at the beginning to pull financial institutions in at the beginning. Also possibly needed is transition finance in the system to help the inter-profession get off the ground, and possibly a public sector finance platform for the inter-profession to efficiently mobilize revenues. Finally, the public sector may need to remain present as the “police” for credible enforcement of “rules of the game” that the inter-profession may decide upon and help broker. As a neutral third party, it can also help negotiate a fair distribution of the risks and value added among the different stakeholders and act as voice for the poorer smallholders and SMEs to ensure they also benefit (directly or indirectly) over time.

## Lessons for iVCD and its study beyond rice

Some of the Pilot learnings also carry over to inclusive value chain development and its study more broadly. Following core insights emerge:

1. **Start small and simple with an initial focus on establishing profitability, and grow.** Value chains and contract farming substantially increase the interdependence among stakeholders. This makes them vulnerable to non-compliance by one of the partners, often a key reason why collaboration and coordination hadn’t happened to begin with. With the judicial system typically weak and legal contract enforcement costly, trust must be relied on instead. It makes increasing trust among the stakeholders a core preoccupation. In this, establishing profitability early on helps grease the wheels, as does open consultation and transparent decision making. Simplicity in protocols as well incentive compatible contract design are also favored. Building on existing organizational structures (farmer organizations) and informal partnerships among stakeholders helps reduce the burden, as does working with slightly more advanced, reliable stakeholders s and partnerships
2. **Prepare well by establishing competitiveness beforehand, but especially build in mechanisms for learning and feedback loops.** Much can be learned beforehand about the competitive nature of the endeavor, its profit potential, and the capacity and motives of the potential participating stakeholders. Selection of participants often works best by fostering competitive self-selection among smallholder farmers both through exclusionary eligibility criteria (e.g. with regard to endowments) and a downpayment on the credit as well as business competitions to select the other stakeholders (mills, input providers, buyers, financing institutions) to support/lead the chain. In this, risk sharing arrangements should be promoted from the start, some of which could initially be further supported by third the party intermediaries. Tight selection criteria and competitive self selection will have to be traded off against sufficient scale to begin a minimally viable ecosystem.
3. **Social objectives are achieved indirectly over time, through spill-overs in learning and access to inputs at the village level as well as the local labor markets.** Sustainability and scaling demand establishing profitability early on. A disproportionate focus on the smallest, most subsistence oriented producers may raise the hurdle too high to do so in the beginning, when contracting arrangements and protocols are still being worked out. Poorer producers likely benefit over time and indirectly as observed in Tanzania following support to the slightly larger farmers. They may benefit as producers, through better local access to knowledge, inputs and machinery services, or through the labor market, as agricultural wage on other farms or through engagement in off-farm activities as the local economy develops.
4. **Long-term public support is key.** iVCD takes time to settle and scale. Sustained public sector effort in terms of research, extension and water control is key, especially for staple crops where the scope for value addition is lower. To sustain the coordination efforts, the development of a self-financing interprofessional organization is key, which likely needs transition finance to get off the ground before it can be sustainted through membership fees. Finally, a neutral third party is often invaluable to help negotiate a fair distribution of the value added across the different stakeholders, act as a voice for the poorer smallholders and agribusiness SMES and mediate disagreements.
5. **More flexible and comprehensive approaches to evidence generation and action learning are needed to study what works in iVCD.** The methodological toolbox currently popular among applied economists often does not lend itself very well for iVCD analysis. RCTs are very powerful to carefully establish the causal effect of a particular relationship or contract design feature (as with the quality price premium). This is useful, yet, many more of them should be done, and external validity is often limited as the results follow from many intervening factors. It also provides a very partial picture only. Others have focused on evaluating the effect of iVCD or contract farming in general, but this in turn is limited given the many different ways to set up and implement the contracts, making it hard to identify what exactly one has evaluated. More operationally oriented research designs are needed that engage with the many and evolving decisions farmers and supply chain actors make throughout the campaign, which make randomization hard and its relevance at times also limited. For example, as demonstrated in the rice Pilot and highlighted by Bellemare, Bloem and Lin (2021, p15): “*offering contracts to farmers by placing them in the treatment group at random fails to mimic farmer selection by processing firms which, in a market economy, is anything but random*”. Randomization should focus on farmers that are likely to be selected by the processing firms instead. More attention to the agribusiness firms’ perspective and firm economics is generally needed. Studying iVCD will also require more qualitative and system-oriented research approaches.

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1. The rice smallholder iVCD pilot (the “Pilot”) is one of three pilot projects the World Bank Jobs Group initiated under the Jobs Multi Donor Trust Fund to explore the potential of Jobs supporting interventions that simultaneously address labor supply and labor demand constraints [↑](#footnote-ref-2)
2. Of the originally selected farmer participants, 44% were enrolled in the cash transfer program in 2019, declining to 28% in the next year, and only 9% in the final year of the Pilot. [↑](#footnote-ref-3)
3. Comparing one-on-one and group based approaches at about one third the cost of one-on-one training to increase managerial capacity in Colombian auto parts firms Iacovone, Maloney and McKenzie (2022) report similar improvements in managerial practices (8-10 percentage points), but much larger and more robust returns to the group based approaches. [↑](#footnote-ref-4)
4. Chamberlin and Jayne, 2020. [↑](#footnote-ref-5)
5. Beegle and Christiaensen (2019). [↑](#footnote-ref-6)
6. World Bank. 2012. *World Development Report 2013: Jobs*. Washington, DC: World Bank. DOI: 10.1596/978-0-8213-9575-2. [↑](#footnote-ref-7)
7. Christiaensen, Demery and Kuhl (2011); Christiaensen and Martin (2018); Dolislager et al. (2021). [↑](#footnote-ref-8)
8. Mellor (2017). [↑](#footnote-ref-9)
9. Van Zeist (2020) [↑](#footnote-ref-10)
10. Sheahan and Barrett (2017). [↑](#footnote-ref-11)
11. Christiaensen and Vandercasteelen (2019). [↑](#footnote-ref-12)
12. Suri and Udry (2022) [↑](#footnote-ref-13)
13. Brummitt et al., (2017). [↑](#footnote-ref-14)
14. https://www.peiglobal.org/ [↑](#footnote-ref-15)
15. Banerjee et al., (2015) ; Bandiera et al. (2017); Bossuroy et al. (2022); Macours, Premand and Vakis (2022). [↑](#footnote-ref-16)
16. Suri and Udry (2022). [↑](#footnote-ref-17)
17. Bellemare, Bloem, and Lin (2021); Meemken and Bellemare (2020). [↑](#footnote-ref-18)
18. Christiaensen and Vandercasteelen (2019). [↑](#footnote-ref-19)
19. Christiaensen (2020); Swinnen and Kuipers (2020). [↑](#footnote-ref-20)
20. Bellemare, Bloem, and Lin (2021). [↑](#footnote-ref-21)
21. Gezahegn et al. 2020. Producer organizations also function more efficiently if they incentivize committee members through monetary compensation. [↑](#footnote-ref-22)
22. The latter is often key when a functioning judiciary system is absent and contract enforcement costs are high. When they are believed to bail out losses, irrespectively, however, they may also undermine incentive compatibility of the chosen contractual arrangements. [↑](#footnote-ref-23)
23. Bilateral arrangements between producers and upstream suppliers or downstream buyers are common. Increasingly one also observes triangular approaches, including financial institutions as a third party. These then provide the credit to producers and/or the VC chain actors (working and/or equity capital) based on their contractual arrangements. [↑](#footnote-ref-24)
24. World Bank (2016). [↑](#footnote-ref-25)
25. Barrett, Reardon, Swinnen and Zilberman (2022). [↑](#footnote-ref-26)
26. <https://www.stagingdata.com/jdp/jobs-mdtf/#pilots>. Support to farmers to raise their labor productivity through higher rice yields and better prices represents the “supply” side of the jobs intervention here, while support to the mills, raising the demand for the goods the farmers produce, the “demand” side. [↑](#footnote-ref-27)
27. Michel Gutierrez and Christiaensen (2023). [↑](#footnote-ref-28)
28. Soullier et al. (2020). [↑](#footnote-ref-29)
29. Christiaensen (2020). [↑](#footnote-ref-30)
30. Wopereis et al. (2013). [↑](#footnote-ref-31)
31. For farmers it is the time between the purchase and use of the inputs at planting and the sale and payment of the paddy rice. For millers it is the gap between the purchase of the paddy rice and the sale and payment of the white rice, unless they only perform milling on commission. For wholesalers and retailers it is the time lapse between the purchase of white rice and the payment by the consumers. [↑](#footnote-ref-32)
32. Fiamohe et al. (2018). [↑](#footnote-ref-33)
33. Except in 2020, in response to COVID, fertilizers in Côte d’Ivoire were not subsidized. [↑](#footnote-ref-34)
34. CIDR)/Pamiga + Centre de Promotion de la Micro-Industrie et du Développement Rural [↑](#footnote-ref-35)
35. Farmers were allowed to team up to reach required acreage, though only one account was opened, with one contact person. This also facilitated participation by female farmers or smallholder farmers with limited land or who did not want to take much risk. [↑](#footnote-ref-36)
36. Among the originally selected farmer participants, 44% were enrolled in the cash transfer program in 2019, declining to 28% in the next year, and only 9% in the final year of the Pilot. [↑](#footnote-ref-37)
37. The VCD approach affects rice production, rice income and agricultural income directly. Indirect effects are agricultural labor and land (re-)allocation, non-farm employment activities, etc. The CT intervention directly increases household income, but (might) indirectly affect households’ human capital, technical skills, entrepreneurship, savings, aspirations, etc. [↑](#footnote-ref-38)
38. With these four data clusters, impact evaluation was expected to quantify the impacts of each of the cash transfer and the value chain development activities independently, and their synergetic effect when combined. [↑](#footnote-ref-39)
39. Arthi et al., 2018; Gaddis et al., 2021. [↑](#footnote-ref-40)
40. Michel Gutierrez and Christiaensen (2023). [↑](#footnote-ref-41)
41. Rice import dependency equals the share of white rice imports over total white rice consumption. [↑](#footnote-ref-42)
42. The simulations are informed by the 2019 national household income and consumption survey which provides a nationally representative, bottom up assessment of Côte d’Ivoire’s rice system labor use and performance in practice. Even though the land allocated to rice is held constant, the simulated job related outcomes are gross figures, i.e. they do not account for alternative opportunities and/or the labor substitution effects away from other activities. [↑](#footnote-ref-43)
43. This equals ~ US$2.34/day (10 Nov 2023). [↑](#footnote-ref-44)
44. Reporting error cannot be excluded. Farmers are know to misperceive the genetic traits of their seeds, with 30 percent misreporting rates regularly reported (Wineman, et al., 2020; Wossen et al., 2022) [↑](#footnote-ref-45)
45. Aihounton and Christiaensen (2023). [↑](#footnote-ref-46)
46. Aihounton and Christiaensen (2023). [↑](#footnote-ref-47)
47. Table xxx does not report the descriptive statistics for farmers using only pesticides. [↑](#footnote-ref-48)
48. Subsidization could be justified to facilitate learning. Yet, given widespread cash crop growing in the pilot areas and following field visits, it was assessed that farmers already had a general understanding of modern inputs use, including in rice. Successful exit strategies from subsidization are also rare. [↑](#footnote-ref-49)
49. Suspicion about the quality of purchased agricultural inputs (hybrid seeds, glyphosate herbicides, urea fertilizer) is widespread among farmers in SSA, with substandard quality, real or perceived, one possible reason for limited uptake. Yet, better evidentiary standards are also needed in peer reviewed social studies to establish how poor input quality really is, with farmer beliefs generally not a good proxy for real input quality (Michelson et al., 2023). [↑](#footnote-ref-50)
50. Post harvest farm gate quality paddy rice prices for the semi-lux varieties were set at the beginning of the season around 150 FCFA/kg depending on the variety and the region. This compares with 125 FCFA/kg which would typically be obtained for local variety paddy rice. [↑](#footnote-ref-51)
51. In practice, the Pilot was not as successful in improving participating farmers’ access to mechanized services as warranted by demand. The market supply of tractor services was not deep in the Pilot areas. And the credit institution involved in the Pilot proved more reluctant to make finance available to farmers to hire tractor services than to procure inputs. [↑](#footnote-ref-52)
52. The last-minute change of input providers was linked to limited liquidity availability at the micro-finance institution following a delay in credit reimbursements during the onset of COVID19 in the spring of 2020. Input delivery contracts were renegotiated in response with providers obliged to accept delays in payments according to 60/40 or 80/20 ratios (60% payment on delivery, 40% after the harvest for fertilizer and pesticides, or a 80/20 split for seeds). New providers had to be identified. New types of seeds and fertilizers and herbicides had to be selected. One batch of seeds turned out to be of very poor quality causing further delays. Moreover, farmers were not familiar with the chosen type of fertilizer and some of the fertilizers and herbicides chosen turned out not to adapted to some of the production sites. The delays in planting were further compounded by an earlier than normal end of the rainy season in Korhogo and Ferkessedougou, causing early maturing of rice plants without proper development of the grains. [↑](#footnote-ref-53)
53. Despite largely insufficient yields during the first two years of pilot implementation, the share of farmers exceeding the 2.5 t/ha threshold progressed gradually from 7 % in 2019 to 17 % in 2020, while the share of farmers attaining 100,000 FCFA net profit per ha increased from 15 to 38 percent in 2020, with 17 percent exceeding 250,000 FCFA/ha. This suggested that profitable intensified smallholder lowland rice production was feasible. [↑](#footnote-ref-54)
54. If more entrepreneurial farmers are more likely to participate, for example, and this is not controlled for, then better farm performance among project participants may result from farmer characteristics as opposed to the project itself. Co-variates specifically included to mitigate against selection bias, are farmers’ willingness to participate in contract farming and their attitude to contract farming (Ruml et al. 2022). In addition, pilot participation was instrumented using the rate of pilot awareness among peers, which is shown to affect pilot participation, but not farm performance (Aihounton and Christiaensen, 2023). [↑](#footnote-ref-55)
55. Average yield among nonparticipants in 2023 is 2220 kg/ha. [↑](#footnote-ref-56)
56. This is at the upper end of the range of income effects of contract farming (25-75 percent) reported by Minot and Sawyer (2016). [↑](#footnote-ref-57)
57. Labor intensity of rice production was slightly higher among participants compared to nonparticipants (111 compared to 100 person days per ha respectively), though it did not increase following the introduction of the pilot. [↑](#footnote-ref-58)
58. It was even slightly lower for pesticide use (Aihounton and Christiaensen, 2023, Tables 10-12). [↑](#footnote-ref-59)
59. Barzola and Christiaensen (2023). Quality standards concerned the 1) degree of impurity (straw, stones, dirt) (0.3 percent of total weight); 2) humidity (between 12-14 percent) and 3) degree of fermentation (<3 percent). Wholesale market research indicated that a 10 percent quality premium for paddy rice (or about 15 FCFA/kg paddy), implying an increase by up to 25 FCFA for white rice (60-65 percent milling rate), could be more than recuperated by the millers on the wholesale market. Depending on the variety (semilux vs lux) and the season (post harvest (Nov-Feb) vs pecuniary (March-July)) good quality white rice fetches 25 to 60 FCFA more than average quality rice. Research around price premiums does not provide clear insights into the optimal value of the premium from the farmers’ perspective, as it depends on the associated cost to meet the quality criteria (as well as the opportunity costs). Similar experiments to incentivize quality maize production showing significant effects considered a price premium between 5% and 25% of the market price (Hoffmann et al., 2018; Magnan et al., 2021). [↑](#footnote-ref-60)
60. Barzola and Christiaensen (2023a, b). To study the shift in initial commercial rice orientation among participants, participants across the three seasons were categorized based on the share of rice sold and the share of land allocated to cash crops at baseline (i.e. before joining the pilot) using k-clustering. The cash crop share of land cultivated was included to proxy competition for attention from other crops. Four groups emerged: 1) subsistence farmers allocating little land to cash crops and selling little rice; 2) commercial rice growers who allocate little land to cash crops and sell a sizeable share of their rice production (47 percent on average); 3) cash crop oriented growers who sold little rice (65 percent of land allocated to cash crops); and 4) commercial farmers who allocated a substantial share of their land to cash crops (56 percent) and sold a substantial share of their rice production (46 percent on average). Commercial rice growers harvested on average 400 to 500 kg more rice per capita. From 2019 to 2021, the share of commercially oriented rice growing participants (groups 2 and 4) increased from 41 to 69 percent (from 21 to 30 percent for group 2 and from 20 to 39 percent for group 4). The share of groups 2 and 4 in the overall *village* population changed from 31.9 to 47.7 percent, indicating that the shift in village selection accounted for 56 percent ((47.7-31.9)/(69-41)=0.56) of the overall shift in commercial orientation. The village shift in commercial rice orientation was fully on account of the selection of villages with more commercial rice growers (group 2). The share of commercial rice growers (group 2) increased by 16 percent (from 11.9 in 2019 to 27.9 percent in 2021), or slightly more than the increase in share of both group 2 and 4. [↑](#footnote-ref-61)
61. It is well documented in the literature that it is the larger, more advanced smalholders who typically engage in contract farming, both because they are more likely in localities that are selected as well as because they are more likely to self select themselves into the contracts (Bellemare, Bloem and Lin, 2021). [↑](#footnote-ref-62)
62. Cash transfers were accorded for a period of three years and over time the CT program was extended to other villages in the pilot areas. The latter had already been selected as eligible villages for cash transfer reception at the outset of the cash transfer program in the mid 2010s. [↑](#footnote-ref-63)
63. In each round about one in five households in the pilot participating villages were CT-beneficiaries (averaged across CT and non-CT villages) (Barzola, 2023). [↑](#footnote-ref-64)
64. They were also more likely to be aware of the pilot (36 and 20 percent respectively). [↑](#footnote-ref-65)
65. Actual participation by female farmers is around 15 percent, reflecting the fact that gender of the household head is an incomplete proxy for the gender of the plot manager. This still signifies and underrepresentation. [↑](#footnote-ref-66)
66. Gniza (2023). [↑](#footnote-ref-67)
67. Rice production is labor intensive (about 100 days per ha) and labor shortages are increasingly reported, in Côte d’Ivoire more broadly, as well as elsewhere in SSA. [↑](#footnote-ref-68)
68. Rice quality is determined by a number of criteria, of which the main one is percentage broken grains: > 35% = ordinaire, 15-35% = semi-luxe, and <15% = luxe. [↑](#footnote-ref-69)
69. Where the enterprise owner was different from the plant manager, it was considered desirable that the owner, as well, have daily involvement in the mill’s operations, and not be over-committed in unrelated activities. [↑](#footnote-ref-70)
70. In 2021, 49 percent of the participants delivered rice that met all three quality criteria (humidity, impurity, fermentation). [↑](#footnote-ref-71)
71. https://isfadvisors.org/the-current-state-of-the-agri-sme-finance-sector/ [↑](#footnote-ref-72)
72. Adjognon, Liverpool-Tasie and Reardon, 2017. Farmers mostly use cash from nonfarm activities and crop sales to finance modern input purchases. [↑](#footnote-ref-73)
73. Wopereis et al. 2013. [↑](#footnote-ref-74)
74. See Stratégie nationale de développement de la riziculture (SNDR 2012-2020). http://www.ondr.ci/sndr\_2012-2020.php [↑](#footnote-ref-75)
75. Duflo et al., 2011. [↑](#footnote-ref-76)
76. Gilbert, Christiaensen, and Kaminski, 2017. [↑](#footnote-ref-77)
77. See Bloom et al. (2020), among others, for the importance of managerial quality for firm performance. [↑](#footnote-ref-78)
78. 59% of the 4050 financial access points are in Abidjan (World bank, 2019). [↑](#footnote-ref-79)
79. Researchers differentiate profit-oriented and non-profit-oriented MFIs based on the composition of their portfolio, the size of their provided loans, and the population targeted (Milana and Ashta, 2012). [↑](#footnote-ref-80)
80. Garcia-Perez et al., 2017. [↑](#footnote-ref-81)
81. The organization of farmers around rice in cooperatives is more frequent in fully irrigated rice. These farmers were often already served with credit and inputs by other organizations as well as the larger mills. They also fell outside the target areas and populations of the Pilot which started out with a strong social objective to generate access to the more remunerative urban rice markets for the poorer and underserved (cash transfer receiving) vilages and smallholder farmers. [↑](#footnote-ref-82)
82. Data on the mills access to and use of formal credit prior to the Pilot were not collected. [↑](#footnote-ref-83)
83. For example, each farmers had to collect the residual amount of his rice sale individually from the bank. When these amounts were small, it sometimes barely covered the transport costs, underscoring the salience of the last mile barrier in accessing inputs and credit in practice. [↑](#footnote-ref-84)
84. See Barzola and Christiaensen (2023) for a more detailed empirical analysis. [↑](#footnote-ref-85)
85. The value of total production is greater than or equal to the amount to be reimbursed. [↑](#footnote-ref-86)
86. During the 3 agricultural campaigns the share of farmers taking a credit between 0 and 50,000 FCFA was 11, 47 and 20 percent in 2019, 2020 and 2021 respectively. The fixed cost amount to 21,300 (=13,500 (one time account opening fee) + 7,800 FCFA (fixed account fee for 6 months)). Once the account opening fee has been paid, they drop substantially to 7,800 FCFA. [↑](#footnote-ref-87)
87. Tchologo and Poro (in orange) are in the North of the country. Thanks to their geographical proximity, in 2020, the mill operating in Tchologo replaced the one operating in Poro during the campaign. Tonkpi is in the East of the country (in blue). [↑](#footnote-ref-88)
88. Loi d’orientation agricole (LOA) du 20 juillet 2015 ; le décret interministériel n° 29 du 20 août 2013 et l’ordonnance présidentielle n° 2011-473 du 21 septembre 2011. [↑](#footnote-ref-89)
89. The contracted area determined the farmer’s production input quantities that needed to be procured, and thereby the credit amount to be provided by the participating financial institution. The credit reimbursement occurred as a deduction made by the miller of the payment made to the farmer upon delivery, with the equivalent monetary value transferred by the miller to the financial institution for that farmer’s loan account. [↑](#footnote-ref-90)
90. During this year three extension agents worked with 137 participating farmers. [↑](#footnote-ref-91)
91. Life insurance was packaged by the credit provider with its credit to farmers for production input as protection against clients’ loss of life and credit non-repayment. Yet, the administrative procedures for obtaining the life insurance pay-out were often cumbersome. [↑](#footnote-ref-92)
92. Comparing one-on-one and group based approaches at about one third the cost of one-on-one training to increase managerial capacity in Colombian auto parts firms Iacovone, Maloney and McKenzie (2022) report similar improvements in managerial practices (8-10 percentage points), but much larger and more robust returns to the group based approaches. [↑](#footnote-ref-93)