**Economic Inclusion Through Value Chain Development in Côte d’Ivoire –**

**Progress Report 2020**

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# Background

This report summarizes the key lessons and insights from the second year of implementation of a pilot that takes a value chain development approach to economic inclusion. It further describes the adjustments made in response for the second year of implementation, both in the pilot implementation arrangements as well as in the research design.

The pilot aims to demonstrate proof of concept of an integrated approach to employment and income generation for the poorer segments of society in developing countries. Integration happens at two levels. First, economic inclusion programs differ from other social protection interventions in that they combine social assistance (through cash or in-kind transfers or public work programs) with a host of interventions to assist the beneficiaries in developing income generating activities. These interventions typically focus on human capital and skills development (skills training, business counseling, life skills development), increasing access to finance (investment grants, village saving arrangements, loans), and coaching. The same intervention package is usually offered to all beneficiaries, based on an overall constraints’ analysis of the target group. They do, however, rarely address particular constraints that sub-groups of beneficiaries might face.

Such a model hinges critically on the assumption that markets exist for the goods and services that beneficiaries may produce. This is often not the case, especially not for the more remunerative agricultural products, for which markets are usually more difficult to access in terms of distance and commercial contacts, especially for more vulnerable population groups. They are usually also more demanding in terms of quality and volume. As a result, poor smallholder farmers often confine themselves to production for auto-consumption instead, selling any surplus on the local markets. To enable smallholder farmers to access the more remunerative agricultural markets, different interventions along the agricultural value chain are usually needed,[[1]](#footnote-2) which address the different constraints faced by producers and buyers at the same time. This is the second level of integration and is commonly referred to as value chain development (VCD).[[2]](#footnote-3) By taking on an integrated approach, simultaneously addressing constraints on the supply and the demand side, synergies are expected to materialize.

Yet, with the integration of a multitude of simultaneous interventions also comes complexity which may in practice erode the potential synergies from integration. Through appropriate intervention design and survey control groups, this pilot tests the effects of such a joint approach on agricultural production and profits, overall household income and consumption, and food security. It examines the synergies from offering cash transfer (CT) beneficiaries with access to markets through VCD, as well as the effects of CT and VCD separately. Details of the research design are provided in Annex1.

More particularly, the pilot tests this integrated approach to employment generation for poor rural producers in the context of rice production and cash transfers within northern and western Côte d’Ivoire. The reasons for this are multifold. First, more than 80 percent of Africa’s poor live in rural areas, earning most of their income in agriculture[[3]](#footnote-4), justifying a focus on income generating activities for the rural poor. Second, rising urban demand for rice in West Africa is increasingly met by imports, constituting a natural domestic market for import substitution. Third, rice is widely grown by smallholders in West Africa, though currently still mainly for auto-consumption. Fourth, cash transfer programs are increasingly becoming the intervention of choice for social assistance (as witnessed most recently in response to the COVID19 pandemic). These trends also hold in Côte d’Ivoire, where rice is considered a strategic crop. The lessons from the pilot can thus inform the expansion of the rice value chain in Côte d’Ivoire, as well as in the sub region more broadly.[[4]](#footnote-5)

For the cash transfer component of the pilot, the pilot is associated with the Côte d’Ivoire Productive Social Safety Nets (PSSN) project, which provides cash transfers to poor households in randomly selected villages in the northern regions of Côte d’Ivoire. The households were identified following a proxy-means-testing (PMT) survey and a community validation process. Beneficiary households receive 36 000 FCFA (~ US$ 61.86) every quarter over 3 years. Cash transfers are complemented with economic inclusion activities, including coaching by social workers, formation of savings groups, entrepreneurship training, and a business grant of 72 000 FCFA (~ US$ 123.71). The VCD component is developed by the pilot itself in partnership with the private sector and is offered both to a subset of the cash transfer villages as well as a subset of the villages not retained for cash transfer distribution from the original PSSN list of eligible villages.

The pilot VCD interventions consists of simultaneous support to smaller scale rice processing units (PU, SME category) (which could be thought of as a labor demand side intervention), support to smallholder producers (which could be thought of as a labor supply intervention) and support to a micro-finance institute (which supports the connection between the labor supply and demand side) to cover some of the additional transaction costs for the micro-finance institution arising from working with smallholder farmers spread across the rural space. Support to the rice PUs consists of technical assistance regarding the technical and financial operation of a rice mill as well as rice marketing, as needed. Through the establishment of a collaborative partnership with the micro-finance institute, access to working capital for post-harvest rice purchasing is further facilitated. Lack of working capital is a common problem faced by smaller PUs, resulting in underutilization of their milling capacity and investment capital. It is also needed to switch from fee-based milling for which the margins per kg have become (too) small (10 FCFA/kg) to a model of transforming purchased paddy rice into white rice for sale. This fetches higher margins per kg of transformed rice, but requires working capital to buy the rice in the market or directly from the producers. The pilot builds 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. The pilot’s support to the producers consists of agronomic training to ensure higher yields of better-quality rice, facilitating access to finance by the same microfinance institute to buy inputs, and technical assistance to help the producers organize themselves in commercial interest groups around rice.

The rice purchasing contract between the PU and the producers stipulates the purchasing price and quality at harvest as well as the quantity to be delivered. It ties the different partners together. It forms the basis for obtaining input credit for the producers and the amount of working capital for the PUs after the harvest. All modern inputs and credit are provided on commercial terms. There are no direct input or credit subsidies provided by the pilot. Instead, the pilot focuses on facilitating interaction and establishing trust between the partners, to reduce transaction costs arising from coordination and contract enforcement which are expected to be particularly high at the beginning. The pilot also takes charge of the extension services provided to the producers and the technical assistance to the PUs. Annex 1 presents the different partners and service providers, and describes the intervention and evaluation design accompanying the pilot in more detail.

The pilot is being implemented in 3 different regions (Tonkpi, Poro and Tchologo). These followed the selection of 3 PUs in rice producing areas[[5]](#footnote-6) with at least 10 cash transfer and 10 non-cash transfer rice producing villages around them within a radius of 30 km. Presence of at least one lowland (bas-fonds) in the village was an additional condition for village selection to minimize the risk of harvest failure through drought. The three PUs (located in Man, Tonkpi region; Korhogo, Poro region; and Ferkessédougou, Tchologo region) represent a poorer, richer; and medium region respectively.[[6]](#footnote-7) They each also have a local branch of the microfinance institute, which was another criterion in the PU selection.

The pilot started its activities and first rice campaign in March 2019. The results of the first campaign and recommendations that emerged from workshops with involved partner are described in the pilot’s progress report dated June 12, 2020.[[7]](#footnote-8) In early 2020, the pilot entered its second campaign, with a few changes, based on the recommendations made at the end of the first campaign: (1) support to intensified rainfed rice production was discontinued, as it is not profitable; (2) participating producers were required to at least dedicate 0.25 ha of land to rice production; (3) lowland rice fields of interested producers were assessed to ensure they are 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 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.

A number of additional insights and lessons emerge at the end of the second campaign, which will be taken into account in the preparation of a third campaign. These lessons follow from regional workshops held in each of the three regions of intervention at the end of the 2020 campaign in January 2021, followed by a national workshop held virtually with all key stakeholders (including producer representatives). These insights are further complemented with a more in-depth quantitative analysis of the administrative data collected for the purpose of the credit administration. Comprehensive baseline data was further collected in August 2020 on the producers’ 2019 cultivation practices and incomes, which will be drawn upon when conducting the impact evaluation.

In what follows, Section 2 reviews the key findings from the workshop and quantitative analysis as well the remedial actions taken in next campaign. Section 3 reflects on the implications for the ongoing research design and budget allocation. These are followed by an Annex which gives more information on the pilot and its implementation arrangements.

# Review of the 2020 Campaign

## Participation

Contracting in 2020 was limited to lowland rice producers. From the 52 participating villages in the 30-km radius around the PUs in 2019, 46 also produced lowland rice (with several of them producing both rainfed and lowland rice). Only a third of the lowland producing rice villages in 2019 (15 out of 46) continued to participate in 2020 (Table 1). This followed from indebtedness (partly due to the failure of rainfed rice production) and disinterest (given still low profitability overall of lowland rice as well in 2019, despite some promising signs) as well as a more strict application of the eligibility criteria (including access to a lowland plot suitable for rice production of 0.25 ha or more).[[8]](#footnote-9) In response, the catchment areas around the PUs was extended to a 50-km radius[[9]](#footnote-10) and 45 additional villages were selected to participate in the program in 2020. This resulted in 60 participating villages in the 2020 campaign overall (20, 21 and 19 around the towns of Korhogo, Ferkessedougou, and Man respectively); 26 were cash-transfer beneficiary villages (Table 2).

Overall, 458 households participated in 2020 (i.e. 142, 211, and 105 around Korhogo, Ferkessedougou, and Man respectively), of which 88 (23%) also participated in 2019 and 131 (29%) were cash transfer beneficiaries. A slightly higher percentage of the cash transfer beneficiaries continued to participate from 2019 (47 out of 131, or 35.9 % vs 23% among all participants). The low repeat participation is importantly driven by the addition of new villages.[[10]](#footnote-11)

**Table 1: The 2019-2020 campaign in numbers**

| **Processing Unit** | **2019** | **2020** |
| --- | --- | --- |
| **Participation (lowland rice only)** |  |  |
| *Number of villages* | 46 | 60 (15) |
| *Number of cash transfer beneficiary villages* | 22 | 26 (8) |
| *Number of producers* | 376 | 458 (88) |
| *Number of producers that are cash transfer beneficiaries* | 167 | 131 (47) |
| **Contracted volume** |  |  |
| *Total land contracted (ha)* | 251.3 | 267.2 |
| *Average land contracted (base for determining credit)* | 0.67 | 0.65 |
| *Average land actually cultivated by contracted producers (ha) (measured after replanting of rice)* | 0.67 | 0.58 |
| *Sales commitment by contracted producers (ton)* | 474.1 | 601.0 |
| *Average sales commitment by contracted producers (ton)* | 1,3 | 1,3 |
| **Credit and inputs** |  |  |
| ***Producers*** |  |  |
| Total value of inputs obtained by producers on credit from COOPEC (million FCFA) | 39.7 | 30.2 |
| Average value of inputs obtained by producers on credit from COOPEC (FCFA) | 105,507 | 65,943 |
| Cost of COOPEC credit to producers (million FCFA) | 3.1 | 3.3 |
| Average cost of COOPEC credit to producers  (FCFA) | 8296 | 7205 |
| Total amount to reimburse (million FCFA) | 42.8 | 33.5 |
| Average amount to reimburse (FCFA) | 113,803 | 73,148 |
| ***Processing Units (working capital)*** |  |  |
| COOPEC credit to PUs (million FCFA) (to buy from pilot producers and others) | 164.5 | 70 |
| **Production** |  |  |
| *Total harvest (ton)* | 277.7 | 343.0 |
| *Average yield (Kg/ha), with null yield* | 1211.2 | 1370.0 |
| *Average yield (Kg/ha), excluding null yield* | 1359.4 | 1572.6 |
| *Total number of farmers with zero yield* | 41 | 59 |
| *Total economic value (value production minus value inputs and credit cost) (including null yield)* (million FCFA) | -5.3 | 22.9 |
| *Average total economic value/ha (value production minus value inputs and cost of credit) (including null yield)* | -15,918 | 73,669 |
| *Average total economic value/ha (value production minus value inputs and cost of credit) (excluding null yield)* | 1,637 | 96,395 |
| *Total sales (ton)* | 201.8 | 182.6 |
| *Total value paddy sales (million FCFA)* | 27.2 | 27.4 |
| *Average net profit (FCFA/ha), with null yield* | -59,340 | -21,030 |
| *Average net profit (FCFA/ha), excluding null yield* | -46,811 | -12,104 |

Note: Number in brackets indicate the number of repeat villages/farmers. Total economic value = harvest\*contract price – (total input on credit + total cost credit). Average net profit = amount sold \* contract price - (total input on credit + total cost credit).

**Table 2: The 2020 campaign by region**

| **Processing Unit** | **Korhogo** | **Ferkessédougou** | **Man** | **Total** |
| --- | --- | --- | --- | --- |
| **Participation** |  |  |  |  |
| *Number of villages* | 20 | 21 | 19 | 60(15) |
| *Number of cash transfer beneficiary villages* | 6 | 9 | 11 | 26(8) |
| *Number of producers* | 142 | 211 | 105 | 458(88) |
| *Number of producers that are cash transfer beneficiaries* | 34 | 59 | 38 | 131(47) |
| **Contracted volume** |  |  |  |  |
| *Total land contracted (ha)* | 71.8 | 147.3 | 39.74 | 267.2 |
| *Average land contracted (base for determining credit)* | 0.52 | 0.80 | 0.51 | 0.65 |
| *Average land actually cultivated by contracted producers (ha) (measured after replanting of rice)* | 0.51 | 0.74 | 0.38 | 0.58 |
| *Sales commitment by contracted producers (ton)* | 166.6 | 343.5 | 90.9 | 601.0 |
| *Average sales commitment by contracted producers (ton)* | 1,173 | 1,628 | 866 | 1,312 |
| **Credit and inputs** |  |  |  |  |
| ***Producers*** |  |  |  |  |
| Total value of inputs obtained by producers on credit from COOPEC (million FCFA) | 8.0 | 14.5 | 7.7 | 30.2 |
| Average value of inputs obtained by producers on credit from COOPEC (FCFA) | 56,476 | 68,607 | 73,393 | 65,943 |
| Cost of COOPEC credit to producers (million FCFA) | 0.8 | 1.8 | 0.7 | 3.3 |
| Average cost of COOPEC credit to producers (FCFA) | 5624 | 8390 | 6961 | 7205 |
| Total amount to reimburse (million FCFA) | 8.8 | 16.2 | 8.4 | 33.5 |
| Average amount to reimburse (FCFA) | 62,101 | 76,996 | 80,355 | 73,148 |
| ***Processing Units (working capital)*** |  |  |  |  |
| COOPEC credit to PUs (million FCFA) (to buy from pilot producers and others) | 30 | 30 | 10 | 70 |
| **Production** |  |  |  |  |
| *Total harvest (ton)* | 68.6 | 198.1 | 76.3 | 343.0 |
| *Average yield (Kg/ha), with null yield* | 921.5 | 1336.3 | 2044.4 | 1370.0 |
| *Average yield (Kg/ha), excluding null yield* | 1118.4 | 1593.0 | 2044.4 | 1572.6 |
| *Total number of farmers with zero yield* | 25 | 34 | 0 | 59 |
| *Total economic value (value production minus value inputs and credit cost)(including null yield) (million FCFA)* | 1.7 | 16.7 | 4.6 | 22.9 |
| *Average total economic value/ha*  *(value production minus value inputs and cost of credit) (including null yield) in FCFA/ha* | 14,111 | 112,320 | 75,408 | 73,669 |
| *Average total economic value/ha*  *(value production minus value inputs and cost of credit) (excluding null yield) in FCFA/ha* | 37,490 | 147,450 | 75,408 | 96,395 |
| *Total sales (ton)* | 42.9 | 112.0 | 27.7 | 182.6 |
| *Total value paddy sales (million FCFA)* | 6.5 | 16.9 | 4.1 | 27.4 |
| *Average net profit (value production minus value inputs and credit cost in FCFA/ha, with null yield* | -35,416 | 20,819 | -85,945 | -21,030 |
| *Average net profit (value production minus value inputs and credit cost) in FCFA/ha, excluding null yield* | -22,285 | 38,372 | -85,945 | -12,104 |

Note: Credit for inputs typically includes seeds, herbicides, insecticides and fertilizer, but at times also for a sprayer.

## Contracted volume and credit uptake

Across the PUs, participating households in 2020 contracted 267.2 ha of lowland rice, with a corresponding sales commitment of 601 tons distributed.11 Compared to 2019, the average land cultivated by producers decreased by 13% in 2020, but the average sales commitment increased by 3%. More than half of committed sales volumes comes from Ferkessedougou. They devote more land per participant and consequently also account for more than half of total sales commitments. On average farmers contract 0.58 ha per participating households, with contracted land larger in Ferkessedougou (0.74 ha) and smallest around Man (0.38). 87% of the households participated with more than 0.25 ha of lowland in 2020 (85.2, 99.5, and 62.9 percent of the participating households Korhogo, Ferkessedougou, and Man respectively).

In 2019, the total credit issued to producers for input purchases amounted to 39.7 million FCFA or about US$ 72,239. Following dedicated efforts to lower input prices, the total credit amount taken up decreased to 30.2 million in 2020 (or US$ 54,953 in 2020), despite a slight increase in the total area contracted. The credit covered the cost for herbicides, improved seeds, and fertilizers, (and sometimes also the purchase of a sprayer, hired labor and/or machinery services). On average, the amount of credit received per producers decreased by 37% in 2020, compared to 2019. The total cost of credit slightly increased from 3.1 to 3.3 million in 2020 but, the average cost of credit spent by farmers reduced by 13% in 2020. The total costs of credit represent 8 and 11% of the total input cost in 2019 and 2020 respectively. The total amount to reimburse by producers is 33.5 million FCFA (~US$60,566 or US$ 132/producer on average).

## Performance – production and profit, sales and marketing, and credit reimbursement

Total output in 2020 increased to 343 ton (from 277.7 ton in 2019). This was largely driven by an increase in yields by about 13 percent or 160 kg/ha (from 1211.2 to 1370 kg/ha) (cultivated area increased by 15.9 ha only, from 251.3 to 267.2 ha). Excluding those with zero output, yields increased by 213 kg/ha (from 1359 to 1572kg/ha) (Table 1). Nonetheless, these results remain far below the 2.5 to 3 ton/ha target necessary to comfortably compensate family labor and be competitive with other activities. The limited increase in yields despite greater selectivity in site and farmer selection as well great attention to agronomic advice, largely results from delayed and poor-quality input delivery following a last-minute change in the choice of input providers.

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).[[11]](#footnote-12) 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.[[12]](#footnote-13) 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.

The villages around Korhogo were most affected by these project implementation challenges, but a number of villages in Tchologo suffered as well. This is reflected in the yields, which were lowest and most variable in Poro14, slightly higher in Tchologo and generally better in Tonkpi (no zero harvests) (Appendix 2, Figure 2). Despite these implementation challenges, the concerted focus on yield improvement also resulted in improvements, with 17 percent of participating farmers now exceeding the 2.5 ton target (compared to 7 percent in 2019), and the share of farmers with a net profit (value of total harvest minus the costs of inputs and credit) increasing from 38 percent in 2019 to 58 percent in 2020 with about half of them attaining more than 150,000 FCFA/ha as compensation for their family labor and any other inputs (labor, threshing, transport).

Outcomes from the farm field school plots confirm that lowland rice production can be profitable, also outside experimental stations, provided the right conditions, inputs and practices. About half of the farm field plots attained 3t or more, with yields on 20% of the farm field plots exceeding 4t/ha or more. The field school plot experience further underscores the importance of 1) water control and lowland adequacy; 2) input quality and adequacy and 3) agronomic practices and producer commitment, with input inadequacy especially undermining yields. Those farm field school plots with 1) water control, clay soils, 2) growing JT11 seed variety, corrective fertilizer supplements and 3) no delays in planting, and clear producer commitment[[13]](#footnote-14) attained substantially higher yields.

Lowlands with water control infrastructure recorded (ceteris paribus) 1.5 ton/ha higher yields on average. The presence of clay soils which enable better water retention was also associated with higher yields (by ~ 700kg/ha). One month delay in planting was associated with a drop in yield of 600kg/ha, possibly capturing the early rupture of rains at the end of the season, while producer commitment (as captured by regular participation in the farmer field school training), was also associated with higher yields (by ~ 1 ton/ha), though some reverse causality cannot be excluded here, as low participation in training may also reflect delays in input delivery and poor quality of inputs. Finally, those plots supplemented with the traditional fertilizer performed substantially better (by more than 2 ton/ha or more), highlighting the corrosive effect fertilizer inadequacy had on yields in plots around Korhogo and Tchologo.

The estimated effects of each of these elements are reported in Appendix 2, Table 7, with the important caveat that each of them may still pick up the effect of other unobserved factors. They should really only be seen as indicative and giving a sense of direction and magnitude, not as causal. Nonetheless, they are consistent with and supportive of the comments and observations expressed during the evaluation workshops with farmers and stakeholders in each of the three regions at the end of the 2020 campaign.

At 30 percent, sales fell far short of commitments (182.6 tons sold compared to 601 tons committed). This is less than in 2019, when sales attained 42.5 percent of the committed quantity. Three forces are at work: 1) following higher expected yields (3 vs 2 t/ha) committed amounts per ha were 0.5 ton/ha higher in 2020 than in 2019 (2.32 vs 1.88 t/ha); 2) while yields were slightly higher in 2020, the share sold was lower (53% of the total harvest in 2020 vs 72% in 2019). Farmers were focused on selling enough to pay back the credit, which was about 40,000 FCFA less per farmer in 2019 than in 2020, and 3) a few other factors (side-selling, auto-consumption, sharecropping).

To see the latter, note that there were substantial differences across regions, with the share commercialized lowest in Tonkpi (36.4%) (compared to 56% in Tchologo and 63 percent in Poro), even though yields in Tonkpi were more than double those in Poro ((2044 vs 921.5 kg/ha respectively). These differences were traced back to a larger degree of sideselling in Tonkpi, given higher market prices induced by traders from Guinea, a larger degree of retention for autoconsumption (rice plots were smallest in Tonkpi, as well as some underreporting following sharecropping arrangements. The role of other factors than autoconsumption is illustrated in Figure 1 which shows a much sharper gradient in the share sold by plot size in Tonkpi than in the other regions.



**Figure 1: Share of total production sold of rice for the 2020 campaign.**

## Credit reimbursement

In 2019, the total value of paddy sales of lowland rice amounted to 27.2 million FCFA, which fell substantially short of the total amount to reimburse to the credit institution (42.8 million FCFA). In 2020, notable progress was also made on this front; the total amount of incurred debt in 2020 amounted to 33.5 million FCFA, while the total value of paddy sales amounted to 27.5 million, still leaving a gap of about 6 million FCFA. Sales remain insufficient to cover all costs. Yet, at 51,450 million FCFA (343 t/ha \*1000\* 150 FCFA/kg) the value of the total harvest is more than sufficient to cover the cost of the credit and the inputs bought on credit (3.3 + 30.2 million FCFA). Insufficient sales to cover the credit follow in the first place from low yields. Many farmers further wanted to keep a certain amount for own consumption, especially in Tonkpi. While yields were highest in Tonkpi, sales were lowest. The total value of paddy rice sales slightly exceeds the loans and loan cost in Tchologo (16.9 versus 16.2 million FCFA), but covers only 74 % of the total credit in Poro (6.5 versus 8.8 million FCFA), declining to only 49% in Tonkpi (4.1 versus 8.4 million FCFA).

The total credit provided to the three PUs for post-harvest paddy rice purchase (pilot and non-pilot rice) amounted to 164.5 million FCFA in 2019. This amount has been decreased to less than half in 2020 (70 million FCFA) due to the difficulty of reimbursement during the 2019 campaign. While smallholders make up the target clientele of micro-finance institutions, from a transactional point of view, it is in the loans to the PUs that the micro-finance institution can earn its return. Their interest in loan provision to the smallholders lies in extending their reach into the villages to promote other savings and loan products (an activity which hasn’t started yet). It is partly also motivated by social motives. From the pilot’s point of view, the input loan provision is a pre-condition for pilot participation.

PUs have reimbursed the first tranche of their loans as scheduled. The PUs servicing Man and Ferkéssedougou are also on track to pay the remainder of their loans, though rescheduling will be needed for the PU servicing Korhogo, given low milling conversion (suggesting theft of white rice) and use of part of the loan to finance equipment for a new mill which the owner has mounted at the start of the 2019 campaign, resulting in a lack of working capital.

# Results of the operational changes made between the 2019 and the 2020 campaigns

The Progress Report of the 2019 Campaign identified seven operational areas for improvement and proposed adjustments going forward. Subsequently, the pilot carried out these adjustments during the 2020 campaign. Below is a description of their implementation as well as an assessment of their results.

**1. Discontinuation of rainfed rice production.** The 2019 campaigned revealed that intensified rainfed rice production is not profitable, therefore no rainfed plots were allowed in the 2020 campaign. Among rainfed plots during the 2019 cycle the average yield amounted to 0.6t/ha, well below the target of 2.5-3 tons/ha to attain profitability. Only about 10 percent of the producers (22 out of 208) were able to produce just enough to cover their input and credit costs. Further analyses have shown that the proposed model is not profitable for rainfed rice production and it was therefore decided to support producers who participated with rainfed plots during the 2019 campaign by paying a compensation for this underperformance which they will use to repay the credit to COOPEC.[[14]](#footnote-15)

**2. Focus on demonstrating profitability in lowland rice production.** With an average of 1370 kg/ha, yields in 2020 were higher than in 2019, where average yields stood at 1,192 kg/ha, or 1,359 kg/ha when excluding the 47 out of 382 lowland rice producers (12 percent) who reported zero harvest. Yet, few producers attained the profitability threshold of 2.5-3 tons/ha. The 2020 campaign has not allowed for lowland rice production to become fully profitable under the proposed model, although progress has been made relative to the 2019 campaign. The recommendations presented in section 4 of this report aim to further exploit the potential of lowland rice production.

**3. Improve agronomic practices and motivate tighter engagement and coordination across value chain actors to increase lowland rice yields.**

1. A formal field selection process was implemented and paid for by the pilot. The Pilot Committee in each region (comprised of the WB’s regional coordinator, the microfinance institution’s credit agent, and the PU’s producer liaison agent) received practical and theoretical training on the selection of suitable lowlands for rice production. Once trained, the group visited the lowlands proposed by the producers to validate their suitability. Quality control was carried out by taking soil samples to observe if the texture was adequate for rice cultivation.[[15]](#footnote-16) Lowlands with sandy soil, soil with accumulated vegetation (plant debris) or floodable were all rejected. Moreover, plot size was required to be at least 0.25 ha, which was validated using a GPS.

However, the application of the selection criteria did not allow to retain only suitable lowlands. Some stakeholders perceived that lowland selection focused on soil quality and less on the actual landscaping and possibility for water control, which led to selection of some fields inadequate to rice cultivation. This was notable in Poro, where floodable and non-developed fields are common, thus with very limited capacity to retain water and to avoid the entry of crop-deteriorating vegetation. Furthermore, focusing on lowland production does not guarantee the availability and management of water resources; some climate conditions, such as earlier end of rain in Poro and Tchologo and floods in Tonkpi, hampered better results.

1. Extension services were substantially strengthened, with a demonstration plot and regular follow up visits in all villages. During the 2019 campaign, extension services provided by an external service provider were only offered in Tonkpi, as the agronomic practices in the region appeared to be less developed than in Poro and Tchologo at the outset of the pilot activities. However, feedback from the 2019 campaign showed a critical need for agronomic support in all regions to drive producers away from traditional rice cultivation practices. Along the full 2020 production campaign, producers in all regions underwent a structured training program[[16]](#footnote-17) which combined theoretical sessions, demonstrations (simulations of key procedures), and practice on a farmer field school, including supervision by extension agents post-training sessions twice a month.[[17]](#footnote-18)

Training demonstrated to be effective, albeit with important room for improvement. The average participation rate across all modules was acceptable: 44% of the villages showed participation rates above 75%, and 25% of the villages reached medium average participation rates (between 50-75%). Regarding the implementation of best practices, follow-up visits detected improvements in the seedling spacing.[[18]](#footnote-19) Furthermore, improvements also depended on the seeding technique applied in the villages, with those regularly attending training applying the techniques that generated the highest yields. Likewise, producers who participated in at least one training module, showed higher yields than those who never attended (1175 kg/ha without training versus 1440kg/ha with training). This increase in yield is higher when controlling for other producer characteristics and the quantity of inputs used that are likely to improve rice productivity (see table 5 in annex). The productivity gains associated with training attendance is more pronounced in Tchologo. However, efforts need to be undertaken in Poro, to understand the factors explaining the insignificant training effect.

The reasons why numerous villages displayed unsatisfactory results in training participation or in training impact are manifold. At producer level, poor motivation, lack of time, prioritization of other activities and health issues led to absenteeism. At the organization level, difficulty to obtain a plot for the farmer field school, trainer’s need to move across long distances, and bad or late communication between trainers and producers and between producers to meet on an agreed date, hampered training implementation. Also, stakeholder´s feedback pointed at two weaknesses regarding training design: theoretical sessions were poorly adapted to producer’s background knowledge and resources, and the program was not fully contextualized to the villages’ ecological conditions and other constraints.[[19]](#footnote-20)

1. Different pilot design features were implemented to improve self-selection of producer participants.The campaign 2019 provided qualitative and proxied-quantitative evidence that producers differed in terms of their dedication to the pilot, and those with higher commitment showed higher yields. As a result, in 2020 the pilot featured the following adjustments to increase producers’ commitment:
   1. The credit file cost and death insurance must be paid upon signature of the contract. 74% of the participating households paid upon signature of the contract. Interestingly, all producers paid in Tonkpi, and the share of producers who paid in the two other regions is above 60%. Producers who paid the credit file cost and death insurance upon signature recorded significantly high yields (1,459.9 kg/ha) than their counterparts who did not pay (1,108.1 kg/ha).
   2. An experiment was conducted whereby participants were required to pay a contribution to their rice commercial interest group (GIC). This is fully explained in point 7 below.
   3. Producers were required to sow either in pockets or in seedbeds with transplantation. The latter practice yields the best results but is also more labor intensive. Indeed, this requirement led some producers not to participate in the pilot during the 2020 campaign.
   4. To engage in the 2020 campaign, producers must have reimbursed their credit of last year’s campaign or concluded an agreement with the micro-finance institute on a repayment plan.
2. Technical visits run by the PU’s producer liaison agents improved substantially.During the 2020 campaign, the PUs’ agents responsible for liaising with the producers conducted 12 visits to their villages to monitor activity and support different pilot events. Among these, opening accounts with the microfinance institution, lowland validation, demonstration of input utilization, quality control of inputs, quality control of plots and crop development, and guiding and organizing the group selling operation. According to the GIC presidents, these visits were highly valued by producers, as they make them feel motivated and reassured.

**4. Measures to reduce costs per hectare.** First, to reduce credit costs, the microfinance institution waived the account opening fee for new participants. Second, to flatten fixed costs over plot size, prospective participants were requested to participate with plots of minimum 0.25 ha which should be measured before contracting using handheld GPS tools. Third, the pilot would seek bulk negotiations with the providers to reduce input prices. The latter has proven difficult to implement, as the input purchase witnessed delays because of the microfinance institution engaging late with input sellers, and having shown little flexibility in implementing their purchase terms. Some of the purchased inputs have also proven of low quality, and had to be replaced, after being delivered in the village, or arrangements were made to review the price of the inputs paid by the producers.

**5. Measures to increase paddy rice quality and opportunities to fetch higher market prices.** Quantitative analysis of the 2019 campaign showed that quality of paddy rice was very important to fetch higher prices and enhance profitability both for producers and PUs. During the 2020 campaign, the pilot implemented the following changes:

1. Support PUs’ marketing strategy to enable them to fetch higher prices for white rice. The CIDR – CPMI-DER Consortium facilitated business contacts between the PUs and larger buyers that would pay higher prices as well as strengthened the PUs capacity to negotiate contracts with these buyers.
2. Encourage PUs to provide a quality premium to producers who deliver lower humidity and higher quality paddy rice. While the idea had been introduced, the PUs have not shown much appetite to introduce such a quality premium: while they perceive such a premium as financial loss, they would actually gain, as less time and resources for paddy rice cleaning and drying would have to be accounted for, and because the same volume of humid rice is heavier than dried rice.
3. Assist PUs in finding financing to invest in better sorting equipment to reach quality standards. This measure has not been implemented yet and will be revisited for the 2021 campaign.
4. Identify another PU to serve the producers around Man that is more engaged with the pilot’s objectives. For Tonkpi, a new PU was identified that contracted with producers affiliated with the pilot. The PU already had a working relationship with the microfinance institution, and hired the old PU’s producer liaison agent, which allowed a direct knowledge transfer. In the Poro region, the PU that partnered with the pilot in 2019 was not eligible for a new loan from the microfinance institution during the 2020 campaign: it had not repaid its 2019 loan or agreed to an acceptable repayment plan, on which basis the microfinance institution decided not to renew the partnership. Instead, a large buyer with a previous relationship with the microfinance institution was brought in to buy the producers’ harvest.

**6. Opening microfinance accounts and credit files for producers within the villages to cut delays in ordering inputs.** During the 2019 campaign, contracting and credit application were slow because producers were required to visit the microfinance institution’s local branch. This caused delays in placing input orders and, consequently, in input delivery to producers. To amend this, during 2020, microfinance agents visited each village[[20]](#footnote-21) for producers to open accounts. However, the application was not uniform across regions and was handled differently by each regional microfinance branch. The Tonkpi branch has proven less flexible than its Poro and Tchologo counterparts in adapting its practices to accommodate the specific needs of smallholder producers. Administering account opening and credit file processes in the villages has further proven difficult to implement because of the distance between the agency and some of the villages (especially in Poro), as well as difficulties related to the organization and availability of producers at village level.

**7. An experimental contribution to increase producers’ engagement with their commercial rice interest group (GIC).[[21]](#footnote-22)** Half of the participating villages were randomly selected to conduct the experiment. In these, participants, upon receipt of the first inputs, were required to pay a 3,000 FCFA contribution to the GIC to facilitate its functioning. Those who didn’t pay risked to be excluded from the pilot. Among those selected to pay, 71% of the participants in selected participating villages (189 farmers) actually paid, with no significant difference regarding yield of selected participants who paid and those who did not contribute to GIC. There is however a significant association between participation in training and the payment of GIC contribution, which could indicate that enforcing GIC contribution could lead to better leadership role in rice production (e.g., participating in training and other activities).

Stakeholder consultations exhibited a concern that the GICs are not successfully ensuring producers’ commitment. It was reported that GIC presidents were not fulfilling their role in guaranteeing that GIC members are selected rigorously[[22]](#footnote-23) and comply with membership rules.[[23]](#footnote-24)

# New insights from the 2020 campaign and recommendations going forward

At the end of the 2020 campaign, new insights emerged, which can be summarized as follows:

**1. The location criterion to select pilot villages as well as the minimum plot size per producer and per participating village could be adjusted to address different opportunities to improve pilot performance.** First, transaction costs for the PU and for the microfinance institution could be cut off if village selection minimized distances between them, and if villages were selected based on their density of participants. Especially in Poro, some villages are far from the PU, with 13 out of 20 more than 25 km away from the PU. Also, some producers in the three regions (61 out of 458) have a plot less than 0.25 ha, in which case the fixed costs on the loan are relatively too high. It was decided that for a third campaign, only producers with at least a plot of 0.25 ha would be allowed to participate, provided that the lowland is appropriate for rice production. Furthermore, it was also decided to require a cumulative plot size of 5 ha per participating village to keep transaction costs for all pilot partners at reasonable levels. During the 2020 campaign, in 27 out of 60 villages less than 3 ha were contracted under the pilot. Second, the closer a village is to the main city, the lower its producers’ interest is on the price offered by the PU for paddy rice. Producers closer to the PUs locality tend to have other options to sell their rice. It is therefore important to focus on improving the quality of paddy rice, for the PU to offer competitive prices and to limit side selling. Third, the pilot could explore expansion to new villages with a higher number of developed plots, and with ecological conditions more suitable for rice cultivation.

**2. Bad quality seeds affected yields for some producers. It is central to enforce quality controls before the purchase and distribution of inputs**. The pilot established a protocol to carry out germination tests on the seeds of potential providers. While the Pilot Committee of each region was informed about the protocol, only the team in Tonkpi was properly trained to apply it. The tests resulted in average germination rates ranging from 67% (Bouaké AM in Tchologo) to 90% (JT11 perfumed in Poro and Tchologo).[[24]](#footnote-25) Despite these protocols, 17 villages in Tchologo received seeds of bad quality[[25]](#footnote-26), and 8 GICs asked to replace them[[26]](#footnote-27), while the others used them anyway. In Poro, 11 villages received seeds of poor quality[[27]](#footnote-28) and only one village asked to have them replaced. For the producers who decided to keep the seeds that did not meet quality standards, the microfinance institution renegotiated prices with the seek providers; and input prices for producers were adjusted. Also, 16 percent of producers used seeds different to those provided by the pilot.

For these reasons, pilot stakeholders accentuated that pre-purchase quality control must be implemented rigorously and more systematically; some even suggested the eventual use of a certification. Also, the CIDR – CPMI-DER Consortium has advised to i) focus on a partnership with ADERIZ or another certified seed firm, ii) shift the responsibility of ordering the seeds from the microfinance institution to the PUs, and iii) run germination tests and quality control before any payment is made.[[28]](#footnote-29)

**3. The pilot encountered several issues with regards to agrochemical inputs, which can be addressed by changing the current procurement arrangement.** Problems experienced relate to the selection, delivery, quality and quantity of agrochemical and phyto-sanitary inputs, as described below. These issues led to producers using products outside the pilot package: the NPK fertilizer was used only in half of the villages, the N20 fertilizer in one third of them, and the pilot post-emergent herbicide in two thirds of the villages.

1. **Insufficient quantity.** The delivered quantity of NPK fertilizer was insufficient for producers’ needs. Thus, producers had to resort to mineral fertilizer bought in the local market with their own means. In fact, those who bought additional fertilizer attained higher yields than those who did not.
2. **Inferior quality**. After observing bad quality among certain inputs, the Pilot Committees in Poro and Tchologo were trained to implement a systematic quality control during July 2020. It was found that the fertilizer Agromax NPK was faulty in at least 11 villages; and in 4 villages producers used it anyways, while the remaining requested replacements.
3. **Inadequate inputs**. Producers reported that selective herbicide was not adequate for certain soil types. Also, the liquid urea nitrogen was not adequate for rice; the few producers who used this input observed its inefficacy, while those who used urea pearls saw better yields.
4. **Delayed or inadequately programmed delivery.** Long delays in input delivery affect producers’ engagement because they are either pushed to purchase inputs elsewhere or see the development of their crop cycle phases affected. Moreover, there is a perception that programming input delivery at three specific dates, according to a theoretical agricultural calendar, penalizes producers whose crop follows an irregular calendar, subject to rain events, which is the case of most of them.

To address these issues, pilot stakeholders and partners have proposed different actions:

1. Deliver the full set of inputs at the campaign onset so that producers freely adapt to the rain calendar.
2. Allow producers to choose inputs from a pre-defined catalogue, instead of ordering a standard input package for everyone. The catalogue should emerge from a dialogue between PUs and producers and advised by technical experts (such as the extensions services partner).
3. Let the PUs be the aggregators of the input orders organized by GIC.
4. Demand input providers to accept a payment modality in two installments.
5. Require input providers to train producers on the utilization of their products.

**4. Barriers to adopting new sowing techniques have raised questions around the requirement to apply them.** Low availability of hired labor in Tchologo and Poro impedes producers to sow in pockets or in seedbeds with transplantation, as required by the pilot. Certainly, it is cheaper and easier to broadcast the seeds (*semis à la volée*), but producers also prefer it for the vast experience they hold. Some partners argue that the pilot could allow producers to use this technique and use training sessions to help producers to improve yields out of it. Other stakeholders consider that the pilot ought to move producers to change their practices, because if they continue using ancient techniques, such as broadcasting the seeds, yields will remain low. However, one producer who used this technique attained yields higher than 4.5 t/ha. This area demands higher attention.

**5. There are strong indications that the contract farming model (buying, transforming and selling) on semi-luxury rice is the most profitable for PUs, but to materialize these gains, they must overcome three important challenges.** Under a feasible scenario[[29]](#footnote-30), the pilot’s business model allows PUs to attain higher profitability over other schemes and thus pay producers on time and at attractive prices. However, during the 2020 campaign none of the three PUs were able to comply with the payment schedule. Below, we describe three main reasons for this:

1. **Insufficient quality of paddy rice.** For the model to work, white rice quality must be such that fetches a market price of 350 FCFA/Kg at the PU. Market under-performance of semi-luxury and luxury rice sold by the PUs is explained by lack of quality control and technical limitations to producing better quality rice (current machinery does not eradicate all impurity). One recommendation to solve this, is to systematically do manual sorting before packaging and to sensitize producers on managing better the understory and rice threshing.
2. **Insufficient volume purchased from the contracted producers.** The minimum for the model to work is 350 tons per year. Data analysis showed that the proportion of harvested paddy rice that is sold to the PU is on average higher than 50% in Poro and Tchologo, but only around one third in Tonkpi.[[30]](#footnote-31) Through a survey applied in Tonkpi[[31]](#footnote-32), the pilot found different conditions that producers wish to satisfy before selling more to the PU. First, they must ensure food security for their families.[[32]](#footnote-33) Second, they require access (including financially) to labor force with the needed skills and technical knowledge.[[33]](#footnote-34) Third, the relative price earned for paddy rice with respect to other crops[[34]](#footnote-35) must increase for the producers to dedicate more time and land to producing rice than other crops. Fourth, gaining more access to machinery services will allow them to considerably expand their production and reduce their dependency in limited availability of labor. But even when producers harvest an amount high enough to reimburse the credit, some choose to repay in cash to the microfinance institution instead of delivering the rice to the PU. Reasons for this are: again ensure food security throughout the year, the obligation to share the plot’s output with co-owner relatives, the obligation to pay the land owner with bags of paddy rice, and preferences for the pilot rice’s taste over other rice available for household consumption.
3. **Weaknesses in the management of the processing unit.** The pilot implemented capacity building from March to October 2020, focused on financial management and accounting, stock management, commercialization capabilities and the contracting model with producers.[[35]](#footnote-36) Nevertheless, lack of rigor at the PU management level and, above all, lack of qualifications among key personnel impeded good performance and compliance with payment schedules.[[36]](#footnote-37) The CIDR – CPMI-DER Consortium who delivered capacity building has concluded that to improve performance, emphasis should be placed on establishing the following staff structure with verified competencies and availability to focus on their tasks: business manager, plant manager, accountant, and the Liaison Officer to monitor the producers.

**6. The utilization of machinery services brought about considerable benefits and supporting producers to access them should continue.** In 2020, the Pilot Committees exchanged with the GICs to estimate the demand for machinery services and to find financing options. Results showed that for Tchologo, 97% of producers favored machinery services for threshing; the estimated need was 514 tons of rice; producers also favored the possibility to get a complementary loan to pay for such services at 30,000 FCFA/ha. Consequently, the microfinance institution updated the credits and the services were contracted to two service providers. For Poro, 34% of producers favored this modality, with an estimated need of 63 tons of paddy rice. In practice, 22% used threshing service in the three regions, with about 32 and 24 percent in Poro and Tchologo respectively. Very few contracted producers used threshing service (5%) in Tonkpi. This is not surprising since Tonkpi is known as relying on a typical traditional production system with very low adoption level of labor-saving technologies. Yield increased by 44% (additional 553 kg/ha) when threshing service is used. Both harvest (827kg) and sales (458kg) increased by around 150% with threshing service. This high increase in the outcomes denotes that threshing could be a recommendable technology to improve farm performance. Around half (49 versus 101 producers) of the participating producers who used threshing service had gotten financial support.

**7. The contracting model promoted by the pilot has great potential to benefit all actors, but it requires better supply chain coordination and effortful participation of everyone involved.** In the 2020 workshop, actors agreed that this model is very demanding in terms of quality management, people management, and mobilization of financial resources; it also requires a level of professionalism and commitment currently not present among all actors. In particular, changing producers’ agricultural and collaboration practices has proven to be a slow process, but there are indications that retaining people engaged pays out: average yields in 2020 were higher among producers who participated in both campaigns (2019-2020) than those who only participated in 2020. Going forward, it will be important to reinforce actions to improve producers selection and their engagement (see Section 3, points 3.iii and 7); for example, enforce conditions on adherence to a GIC, extend the obligation to pay a “GIC membership fee” before signing up for a credit, preclude producers with different crops or professional activities from participating in the pilot[[37]](#footnote-38), and tie input delivery to training participation. More broadly, to improve coordination across value chain partners, project management and monitoring commitments could be explored.

**8. The design of the contracting model could be revised to better distribute risk across actors.** Currently, the microfinance institution absorbs the higher share of the financial risk, which they try to mitigate by getting highly involved in the input procurement process: they choose input providers and the input package. This scheme has proven to come with many inefficiencies, including because of a lack of agronomic knowledge and lengthy procedures at the microfinance institution. The partners felt that it would be important to think about ways to limit the microfinance institution to its role as loan provider. This merits a discussion on how to better share risks across actors, including input providers by using a payment scheme which conditions payment upon quality verification (see also Section 3, point 5).

**9. The pilot could assess the suitability of the current credit model.** For example, there may be a need to propose financial products that respond better to producers’ constraints linked to the agricultural cycle, and to PUs’ constraints related to their input’s procurement needs. In both cases, a model of a credit line could be beneficial. Furthermore, the microfinance institution currently contracts individually with smallholder farmers, which comes with high transaction costs along heavy procedures. One option to explore might be to allow groups of 2 to 3 producers to ask for a joint loan. The PU-producer contracts would also have to be adjusted accordingly.

**10. The pilot saw relatively high pilot participant dropout rates between the 2019 and the 2020 campaign, which merits reflection on actions to reduce it.** Between the 2019 and the 2020 campaign, 288 out of 376 producers in lowland abandoned, and 370 new producers joined the pilot. Results from a survey indicate different reasons for their dropout. In order of frequency: doubts about the quality inputs provided by the pilot, such as seeds and fertilizers (40%), delays in input delivery (25%), lack of time to commit (19%), health problems (8%), others (9%). To increase participants’ retention, it is vital to improve communication and establish a trustful relationship with them. This is especially important in light of the fact that those who participate in both campaigns had higher earnings in 2020 than those who newly joined the pilot. Specifically,

Another insight is related to the contribution to the GIC, where a notable participation in training is associated with the producers’ contribution to GIC. However, the yield is not impacted by producers’ level of commitment. Therefore, not only should the contribution of the GIC be strengthened, but it is important to link producers’ organizations to sharing experience and strengthening training programs with extension services. With intensive support for sustainable training through the operation of the GIC, the performance of the farm could be improved.

# Recommendations to take into account for the 2021 campaign:

While the delivery model could be further consolidated and a better understanding of the rice value chain economics has been established over the last two campaigns, manifold challenges remain to be solved. It is proposed to engage in a third rice campaign to further consolidate the delivery model, taking into account the recommendations laid out in this section:

**1. Conditions for participation:** Participating producers need a plot with a size of at least 0.25 ha; and within the village, at least a combined 5 ha of contracted plots. Also, participating villages should not be located farther than 25 km from the PU and/or grouped with other participating villages. Further, producers must have fully reimbursed their 2020 loan, or have agreed on a reimbursement plan with the microfinance institution.

**2. Field selection process:** The updated field selection process to identify lowland suitable for rice production will not only take into account the quality of the soil, but also landscaping aspects, such as possibility for water control; control for floods; and climate conditions.

**3. Financial contribution to GIC:** As an additional producer selection criterion, all producers will be asked to financially contribute to the functioning of the GIC. It proves their motivation and commitment to engage in the pilot and will strengthen the GIC’s role as liaising structure with the different partners of the pilot.

**4. Strengthen extension services and incentivize producers to participate in trainings:** Extension services will be further adapted to the ecological conditions of the region and will mainly focus on practical (vs. theoretical) knowledge transfer. Also, an effort will be undertaken to communicate dates of the training early on to ensure availability of producers.

**5. Further simplify and streamline credit opening and contracting processes:** An effort will be made to further simplify credit opening and contracting processes, with the objective of reducing transaction costs. Also, the microfinance institution does not apply procedures in a streamlined manner across the three piloting regions, which would be important to reduce coordination costs and avoid delays at the outset of the campaign.

**6. Review the input provision process:** It will be explored how to strengthen quality control of inputs before purchase and delivery; to enter a partnership with ADERIZ or a certified seed firm for input provision; to shift the responsibility of ordering the inputs from the microfinance institution to the PU; and to provide producers with a catalogue of inputs they can choose from.

**7. Introduction of quality premium:** The idea of providing a quality premium to producers who deliver lower humidity and higher quality paddy rice will be reintroduced, given the importance of the quality of rice to access high value markets and render the piloting model profitable. Also, the marketing strategy of the PU will be further strengthened to improve access to high value markets.

**8. Explore options to increase the access to machinery services:** Based on the 2020 campaign, it will be explored how to increase the access to machinery services, including through facilitation of access to credit lines and grouping of producer demand for such services. This is to help producers overcome the lack of labor, increase their productivity and improve the quality of the harvested rice.

**9. Review the distribution of risks among actors:** Options will be explored on how the risks could be more evenly distributed among the value chain actors. During the 2019 and 2020 campaign, the microfinance institution absorbed the highest share of the financial risk, which they tried to mitigate by getting highly involved in the input procurement process, with limited success.

**10. Incentivize producers to participate again:** Options to ensure a high retention rate among producers who participated in the 2020 campaign will be explored, to ensure positive learning effects. The focus will be on those who have participated successfully, including acceptable yields, participation in extension service trainings, and reimbursement of the 2020 loan.

# Analytical activities and dissemination

Administrative data on the surface cultivated under contract, the amount and value of inputs obtained, the total amount of credit, the total harvest and sales as well as the humidity level and quality of the sold harvest were collected throughout the 2019 and 2020 campaign.

An initial data collection from about 3 400 households in the 60 treatment villages originally selected for program roll out as well as 60 control villages were further collected in August 2019, with reference to the 2018 agricultural year for the agricultural income. In Summer 2020, the actual baseline data collection was conducted in the 60 participating villages of the 2020 campaign. Modules covered include the household roster, agriculture, assets, elaborate sections on rice cultivation, income sources, access to credit, pilot participation.

More details on the research design to analyze the effects of cash transfers, VCD and the potential synergies of combining both is in Annex 1. This will require an endline data collection in February 2022, at the end of the third campaign, which would allow the intervention to run its course and establish itself. In case new villages will be added for the 2021 campaign, baseline information will have to be collected in these villages during the Summer of 2021.

In addition to the core evaluation question, a number of subtopics will further be examined, including the determinants of pilot participation using the 2020 baseline data, resulting in 3 papers of academic quality. Four blogs were further published during 2019 and more are anticipated as the pilot unfolds. The pilot further seeks to reflect the lessons and insights of the pilot in a book, drawing on the practical experience of the pilot implementation and grounded in a rigorous analysis of the processes and results (including cost-benefit analyses of the different sub interventions). It would be aimed at policy makers and practitioners. A preliminary outline of the book is below:

|  |
| --- |
| **Outline**  **Value chain development in practice – Insights from an application to rice in Western Africa** |
| *Each chapter frames the challenge, reviews the findings from the literature, elaborates what the pilot did within this context, including insights on private and social returns, and present the lessons learned* |
| 1. Introduction   Principles of VCD and Economic Inclusion;  Underfunded and undercoordinated rice value chains   1. Finding reliable partners   Reaching everyone or selecting winners (producers, mills, financial institutions) |
| 3. Economics of rice production  Extensive vs intensive  Importance of water control  Other factors affecting profitability |
| 4. The mill’s perspective  Pros and cons of large vs small mills  Business models focused on volume (milling on order, purchase/mill/sell) or value (contract farming)  Efficient milling - cost/benefit of the different models |
| 5. Who provides the credit  Business model (individual vs group lending; cross subsidization)  Cost/benefit of supporting value chain development |
| 6. Employment generation along the chain  Producer, transport, milling, distribution |
| 7. VCD in a context of cash transfers  VCD as a way to sustainable economic inclusion |
| 8. Lessons for VCD in staples  Way forward (value addition, transaction cost and digitization, role of producer organizations) |

**Annex 1: Description of the intervention during the 2020 campaign**

1. **Piloting regions and pilot beneficiaries**

The pilot intervenes in 3 regions: Tonkpi, Poro and Tchologo. The regions were selected based on the share of PSSN project beneficiaries already cultivating rice; the availability of an operating rice mill and presence of a regional UNACOOPEC branch; and water availability for rice production in the region.

The pilot works with one rice mill in each region that has the capability and ambition to play a catalytic role in developing the value chain in an inclusive manner. The pilot focuses on rice mills with a processing capacity of 1 to 2 tons of paddy rice per hour (or 2000-4000 t/year). Unlike the mills with a processing capacity below 1 ton per hour, which are widely spread across the villages, these medium sized mills (with separate modules for shelling and whitening) allow to produce white rice that meets the quality standards of the urban markets needed to compete with imported rice, They are also closer to the smallholder farmers than the mills with a processing capacity of 5 tons per hour, which have been the focus of the government..

The three rice mills the pilot is working with were selected following an in-depth assessment by a Consortium of the *Centre International de Développement et de Recherche (CIDR)* and the *Centre de Promotion de la Micro-Industrie et du Développement Rural (CPMI-DER).* The assessment focused on business performance, marketing capacity and the ability to act as a catalyst in the surrounding areas for high quality smallholder rice production for the urban markets. The selection of rice mills to work with was validated by a consortium of partners working on the pilot.

For the 2020 campaign, the 2019 participating rice mill in the Tonkpi region was replaced by another mill. In 2019, the low paddy price offered by the PU servicing the Man area proved problematic, resulting in low pilot uptake and side selling. Furthermore, given limited overall engagement with the objectives of the pilot, it was decided to identify another mill to serve the producers around Man. A mill in Guiglo (@ 70 km from Man) was identified to be interested. This mill had already worked with the micro-finance institute, and was willing to continue to employ a local liaison agent to liaise on a regular basis with the producers.

Direct beneficiaries of the pilot are rice producers in the catchment area of selected rice mills, as well as the selected rice mills themselves. Beneficiary producers are either cash transfer or non-cash transfer beneficiaries in beneficiary villages. In the catchment area of each of the selected rice mills, the pilot supports rice producers in 20 villages, 10 of which are part of the PSSN project. Indirect beneficiaries of the pilot are the communities benefitting from spillover effects in the catchment area of the selected mills as well as those in the rice chain (transporters, wholesale and retail).

For the 2020 campaign, some of the participating villages from 2019 decided to no longer participate, and were replace by new villages. In 2020, 20 villages, of which 3 PSSN beneficiary villages participated in Poro, 21, of which 8 PSSN beneficiary villages in Tchologo and 19, of which 11 PSSN beneficiary villages in Tonkpi.

1. **Consortium of partners implementing and evaluating the pilot**

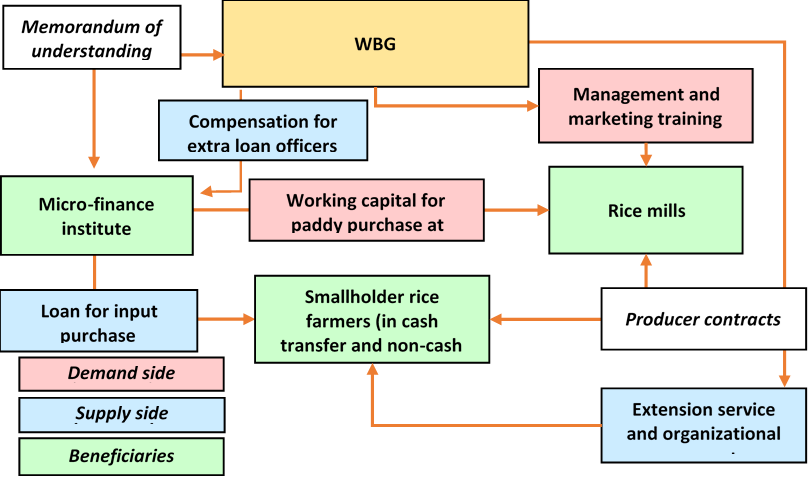
A consortium of partners implements and evaluates the pilot:

* National Rice Development Agency (ADERIZ, *Agence pour le développement de la filière riz*)
* Jobs Group of the WBG
* International Development and Research Center (CIDR, *[Centre International de Développement et de Recherche](http://www.cidr.org/)*)
* Center of Micro-Industry Promotion and Rural Development (CPMI-DER, *Centre de Promotion de la Micro-Industrie et du Développement Rural*)
* Côte d’Ivoire Microfinance Institute[UNACOOPEC-CI](https://www.unacoopec.com/)
* Crop Production Company (SPV, *Société de Production Végétale*)

In preparing the Economic Inclusion into Value Chains pilot, the WBG pilot team conducted extensive consultations with public and private stakeholders as well as other development partners, such as GIZ and the African Development Bank.

1. **Intervention design**

The economic inclusion into rice value chain pilot simultaneously addresses labor supply and demand side constraints, to improve the economic inclusion of poor households.



**Component 1: Support package for producers to improve productivity and enhance market access**

This component focuses on addressing labor supply side constraints. It offers smallholder farmers (i) organizational support; (ii) access to finance for input purchase; and (iii) extension services to improve productivity and enhance market access.

***Organizational support:***

Beneficiary producers are linked with a close-by rice mill through a production contract. The contract states the producer’s commitment of producing rice for the mill and the mill’s commitment of buying paddy rice at a set price at harvest. The mill’s Producer Liaison Officer (*Chargé de suivi des producteurs*) supports the development of a commercial interest group (*Groupements d’intérêt commerciaux*) among contracted producers in each beneficiary village. It allows producers to share knowledge on rice production and group their paddy rice for collection, and the mill to lower transaction costs in working with smallholder farmers.

***Access to finance for input purchase:***

The pilot facilitates access to a loan for input purchase for beneficiary producers from UNACOOPEC. UNACOOPEC is a local microfinance institute with branches throughout Côte d’Ivoire. The poorer segments of society are at the core of their clientele. It partners with the pilot to expand its presence in the agricultural sector and thus extend its reach to this clientele. In a first step, producers open a bank account at the regional COOPEC branch. In a second step, producers submit a loan request for input purchase, such as seeds, herbicides and fertilizers that is being vetted by the COOPEC branch.

***Extension services:***

Beneficiary producers are offered extension services to ensure the correct application of inputs and modern production, harvest and post-harvest techniques. These services include trainings on agronomic techniques, as well as an introduction to basic bookkeeping. The services are offered by the mill’s Producer Liaison Officer as well as SPV, an external service provider contracted by the pilot.

**Component 2: Support package to rice mills to improve milling capacity and enhance market access**

This component focuses on addressing labor demand side constraints. It offers selected rice mills units (i) access to working capital on commercial conditions; and (ii) training on management and marketing practices to improve milling capacity and enhance market access.

***Access to working capital:***

The pilot facilitates access to working capital for participating mills from the UNACOOPEC. By connecting rice mills with the regional UNACOOPEC branch, the pilot addresses the mills’ liquidity constraints. Additional working capital allows mills to buy larger volumes of paddy rice from its producers and pay them cash at harvest. With a steady supply of quality rice, mills are expected to be able to serve larger markets in urban areas with higher quality requirements and obtain a higher price. This in turn allows them to offer a better price to the producers and thus an incentive compatible contract.

***Training on management and marketing practices:***

The owners and employees of the selected mills are offered business management, marketing, financial management and technical operation trainings:

(a) The first type of training aims to structure the supply of paddy rice through cooperation with producers. It mainly concerns the mills’ Producer Liaison Officer (*Chargé de suivi des producteurs*), and to a lesser degree, the owner.

(b) The second type of training aims to improve the company’s management, the technical operations and marketing. It addresses the mils’ owner and the accountant.

(c) The third type of training aims to strengthen the mills’ owner’s management capacity (business plan development as well as management of human resources, quality, business partnerships, including with banks and wholesalers etc.).

The trainings are delivered by a Consortium of the *Centre International de Développement et de Recherche* (CIDR) the *Centre de Promotion de la Micro-Industrie et du Développement Rural* (CPMI-DER).

**Component 3: Analytical work, project management, monitoring, evaluation and dissemination**

This component supports the implementation and monitoring of pilot-related activities and the evaluation of pilot outcomes. It entails (a) preparatory analytical tasks; (b) project management; (c) coordination among actors involved in the implementation of the pilot with a field coordinator based in Abidjan and a decentralized coordinator in each piloting region; (d) monitoring and reporting on pilot results; (e) impact evaluation to measure pilot effectiveness on beneficiary outcomes; and (f) dissemination of findings.

1. **Evaluation design**

The pilot is accompanied by an impact evaluation (IE). The first set of research questions arise from identifying whether implementing the Cash Transfer (CT) program and the VCD approach separately have a significant and substantial effect on the target audience. Another research question is whether there are synergetic effects by combining the CT program with the VCD. The IE’s core hypothesis is that an integrated CT and VCD approach creates synergetic effects on the income of poor rural households

Impacts are measured in terms of household income as well as its different subcomponents (rice production, rice income and other crop income, nonagricultural income, and transfers). Both interventions may further have spill-over effects on non-program participants within the villages.

The (random) assignment of the interventions is defined at village level. Villages were classified in four groups based on two criteria, i.e. whether 1) the village is beneficiary of the CT intervention or not; and 2) whether the village is within the (30km) catchment area of the rice mill that is supported by the pilot or not. Thirty villages were randomly selected from each group. Control villages without VCD were selected from Gbeke Region again within 30 km around rice mills with similar characteristics as the ones selected for the VCD intervention. This yielded another 60 villages (30 receiving cash transfers and 30 receiving no support from the project).

|  |  |  |
| --- | --- | --- |
| **Treatment groups** | **Type of PSSN village** | **Village in catchment area of rice mill that is** |
| **1) VCD + CT** | Beneficiary | Supported |
| **2) VCD** | Control | Supported |
| **3) CT** | Beneficiary | Not Supported |
| **4) 0** | Control | Not Supported |

Following an initial data collection round in summer 2019, the baseline data collection took place during the Summer of 2020 and randomly sampled about 25 households within each village (with 10 of them first randomly sampled from the pilot participants beneficiaries). The next round of data collection is expected to take place in Spring of 2022. Rapid beneficiary surveys and administrative data collected by the implementing partners of the Jobs pilot allow to monitor progress over time.

A research program is further set up to examine a series of related sub questions such as the determinants of participation in rice commercialization (as opposed to more extensive production for auto consumption, given the other agricultural and nonagricultural activities (cotton, cocoa, maize, etc.), the formation and performance of commercial interest groups, the features of the local rural labor markets which are signaled to be characterized by labor shortages, an account of employment generation within the chain (in the mill, through transport, distribution), cost-benefit analyses for the different partners (producer, mill, micro-finance institute).

1. **Timeline**

Implementation of the pilot project began in 2018, with the preparation of the pilot design and the intervention, as well as an in-depth analysis of the capacity of the rice processing units in the regions.

The actual implementation of the interventions began in early 2019, with the 2019 rice season. It is planned to support the various actors for up to three agricultural seasons.

Data collection for the impact evaluation is anticipated for early 2022, at the end of the third season supported under the piloting activities.

**Annex 2: Economic analysis**

**Productivity and net profit of lowland rice production, largely increased during the 2020 campaign, respective to the 2019 campaign**. The increase seems to be consistent across all regions. With regard to productivity, 17% of rice farmers obtained more than 2.5 tons/ha in 2020, against only 7% in 2019. The proportion of producers with the highest yield is more pronounced in Tchologo. Yields are lower in Poro, widespread in Tchologo and better in Tonkpi. Surprisingly, small scale producers sold more paddy rice than large scale producers. The remaining part could be used for household food needs. In terms of farm profit, although there is a light improvement in 2020, 50% of producers obtained negative net profit in both campaigns. Poro is by far the region with the lowest economic performance. In such context, a lot still needs to be done to achieve a reasonable profitability scale. Productivity and net profit tend to be driven by participation in training programmes.

**Outcomes from the farm field school plots showed that it is possible to obtain high yields in our regions, under the right conditions, inputs and practices**. Yield exceeded 2.5 tons/ha on the majority of the field school plots in the three region. About 20% exceed 4t/ha, which confirm that under appropriate condition, yield could be improved. Yield is expected to be high under the following appropriate characteristics: 1) water control, clay soils, 2) growing JT11 seed variety, corrective fertilizer supplements and 3) no delays in planting, and clear producer commitment attained substantially higher yields. Lowlands with water control infrastructure recorded (ceteris paribus) 1.5 ton/ha higher yields on average.

**Rice yield improved in the three regions during the 2020 season (Figures 1 & 2).** Globally, 17% of rice farmers obtained more than 2.5 tons/ha in 2020, against only 7% in 2019. More specifically, 11% of rice farmers recorded more than 2.5 tons/ha in Tchologo, and only 6% and 2% exceeded the threshold of 2.5 tons / ha in Tonkpi and Poro respectively in 2019. The poor performance of rice production in 2019 called for more efforts to improve rice productivity in 2020. Then, the proportion of rice producers having obtained more than 2.5 tons, increased drastically in the three regions in 2020: Poro (10%), Tchologo (19%) and Tonkpi (21%). The yields are much lower in the Poro; widespread in Tchologo and generally better in Tonkpi. Despite a high yield in 2020, more than half of rice producers remained below 2 tons/ha in both seasons.



**Figure 1: Distribution of rice yield in for the 2019 campaign.**

****

**Figure 2: Distribution of rice yield for the 2020 campaign.**

**Rice producers in the three regions are different with respect to most characteristics: gender, GIC contribution, training participation, proportion of producers who paid both credit file cost and death insurance and use of threshing service (table 3).** Overall, most of the participating producers (87%) are men, with a statistically significant difference between the three regions. Around 80% participated in at least one training session in the three regions, with the highest participating rate in Poro (96%). While all farmers selected to pay the GIC contribution, paid their GIC contribution in Tchologo, only few farmers paid it in Poro (40%) and about half paid in Tonkpi (57%). Moreover, while all producers paid both credit file cost and death insurance in Tonkpi, Poro and Tchologo are still behind with 73 and 63% payment rate respectively. Since machinery use was lower in all three regions, efforts were made to facilitate rice producers' access to machinery, especially threshing services. On average, only 22% of producers used threshing services in the three regions, with Poro recording the highest rate (34%). Rice producers hardly used threshing services in Tonkpi (5%).

**Table 3: Descriptive statistics of some key variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Poro** | **Tchologo** | **Tonkpi** | **All** | **Sig.** |
| Gender (1=Male, 0=Female) | 0.79 | 0.95 | 0.85 | 0.87 | \*\*\* |
| GIC contribution at producer level (1=Yes, 0=No) in GIC Sample | 0.40 | 1 | 0.57 | 0.71 | \*\*\* |
| GIC contribution at producer level (1=Yes, 0=No) in the whole sample | 0.23 | 0.56 | 0.37 | 0.41 | \*\*\* |
| Training participation  (1=Yes, 0=No) | 0.96 | 0.78 | 0.84 | 0.84 | \*\*\* |
| Proportion of producers who paid both credit file cost and death insurance | 0.73 | 0.63 | 1.00 | 0.74 | \*\*\* |
| Use of threshing service (1=Yes, 0=No) | 0.32 | 0.24 | 0.05 | 0.22 | \*\*\* |

\*\*\* significant at 1%

**The use of appropriate threshing services is associated with harvest and sales gains (Table 4).** Indeed, rice producers who used threshing services obtained on average more yield (553 kg / ha) and harvest (827 kg) than those who did not use the threshing service. There was also a substantial increase in the quantity sold (458 kg) with the use of threshing service. Yet, reverse causality cannot be excluded, i.e. those with higher yields/harvests decided to use threshing services.

**Table 4: Threshing service and farm outcomes.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcomes** | **Ensemble**  **(1)** | **Threshing Service (No)**  **(2)** | **Threshing Service (Yes)**  **(3)** | **Difference**  **(4) =(3)-(2)** |
| Yield (kg/ha) | 1,370.0 | 1,246.9 | 1,799.8 | 552,9\*\*\* |
| Harvest (kg) | 748.84 | 564.9 | 1,391.0 | 826.9\*\*\* |
| Sales (kg) | 398.6 | 296.6 | 754.3 | 457.7\*\*\* |

**Producers who participated in at least one training module showed on average higher yields than those who never participated, in particular in Tchologo (Table 5 & 6).** The increase in yield is reinforced by controlling for other producers’ characteristics and the quantity of inputs used that are likely to improve rice productivity. Productivity gains linked to attendance at training session are more pronounced in Tchologo. However, efforts need to be made in Poro and Tonkpi, to understand what is hindering the training effect. Yield is also high when more herbicides are used on the rice plots, especially in Poro and Tchologo.

**Table 5: key factors explaining rice productivity (with the quantity of inputs used).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **All** | **Only Poro** | **Only Tchologo** | **Only Tonkpi** |
| **Variables** | **Dependent variable: ln( yield + 1)** | | | |
| Gender (1=Male) | -0.11  (0.41) | -0.96  (0.93) | 0.32  (0.82) | 0.34\*  (0.17) |
| Training participation (1=Yes) | 1.08\*\*\*  (0.36) | 0.27  (1.17) | 1.29\*\*\*  (0.39) | -0.07  (0.18) |
| Cash transfer beneficiary (1=Yes) | 0.02  (0.18) | -0.11  (0.68) | 0.27  (0.52) | -0.26\*\*\*  (0.06) |
| GIC contribution  ( 1=Yes) | -0.04  (0.44) | 0.33  (0.57) | -4.11\*\*\*  (0.30) | 0.28  (0.24) |
| ln( land size cultivated) | 0.29  (0.22) | 0.44  (0.45) | 0.18  (0.35) | -0.12  (0.12) |
| Seed variety (1= Bouaké AM) | 0.03  (0.17) | 1.60  (1.36) | 0.64\*\*  (0.30) | 0.00  (0.10) |
| ln( NPK + 1) | 0.19  (0.13) | -0.24  (0.47) | 0.29\*  (0.14) | 3.37  (19.65) |
| ln( Urea + 1 ) | -0.58  (0.54) | 0.95  (1.64) | -0.65  (0.56) | -1.63  (13.77) |
| ln( Herbicide + 1 ) | 1.15\*\*\*  (0.31) | 1.69\*\*\*  (0.42) | 0.93\*\*  (0.41) | -2.58  (32.32) |
| Villages fixed effects | Yes | Yes | Yes | Yes |
| Constant | 5.03\*\*\*  (1.20) | 4.41  (4.02) | 5.22\*\*\*  (1.70) | -1.47  (34.62) |
| Observations | 434 | 119 | 210 | 105 |
| R-squared | 0.37 | 0.41 | 0.27 | 0.34 |

Note: Yield and inputs quantities are expressed in kg/ha. Clustered Robust standard errors calculated at villages’ level are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6: key factors explaining rice productivity (without the quantity of inputs used)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **All** | **Only Poro** | **Only Tchologo** | **Only Tonkpi** |
| **Variables** | **Dependent variable: ln( yield + 1)** | | | |
| Gender (1=Male) | -0.06  (0.49) | -1.11  (1.09) | 0.70  (0.93) | 0.34\*\*  (0.15) |
| Training participation (1=Yes) | 1.35\*\*\*  (0.40) | 1.70  (1.51) | 1.51\*\*\*  (0.40) | 0.07  (0.22) |
| Cash transfer beneficiary (1=Yes) | -0.12  (0.18) | -0.08  (0.74) | -0.13  (0.51) | -0.22\*\*  (0.08) |
| GIC contribution  ( 1=Yes) | 0.08  (0.49) | 0.87\*  (0.48) | -3.55\*\*\*  (0.24) | 0.19  (0.23) |
| ln( land size cultivated) | 0.07  (0.21) | 0.07  (0.53) | 0.10  (0.35) | -0.11  (0.08) |
| Seed variety (1= Bouaké AM) | 0.08  (0.17) | 1.06  (0.85) | 0.37  (0.51) | -0.00  (0.11) |
| Villages fixed effects | Yes | Yes | Yes | Yes |
| Constant | 7.10\*\*\*  (1.13) | 5.44\*  (2.69) | 4.41\*\*  (1.93) | 6.59\*\*\*  (0.38) |
| Observations | 434 | 119 | 210 | 105 |
| R-squared | 0.32 | 0.31 | 0.22 | 0.31 |

Note: Yield are expressed in kg/ha. Clustered Robust standard errors calculated at villages’ level are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Although there is slightly improvement in the net profit[[38]](#footnote-39) of rice producers in 2020, more than 40% of producers obtained negative net profit in both campaigns (62% in 2019 and 42% in 2020).** The distribution of net profit (Figures 3 and 4) in both campaigns, indicate that growing rice is not a profitable activity. At least 60% of rice producers recorded negative profit in Poro in both years (70% in 2019 and 65% in 2020). Although considerable improvement in net profit is observed in Tchologo (54% of negative profit in 2019 against 34% in 2020), and Tonkpi (82% in 2019 against 29% in 2020), this gain is far below expectation. However, the proportion of producers who obtained more than 250 thousand FCFA, substantially increased (from 7% in 2019 to 17% in 2020).



**Figure 3: Distribution of net profit for the 2019 campaign.**



**Figure 4: Distribution of rice net profit for the 2020 campaign.**

**Training participation has substantial positive effect on net profit of rice producers**. **Farmers with large rice plot also tend to have high net profit (table 7)**. Indeed, producers who participated in the training received intensive technical knowledge on yield improving practices. However, given that only rice producers in Tchologo largely obtained high net profit, it is crucial to further examine potential factors of success and failure in each of the three regions. Moreover, large scale rice farmers’ recorded high net profit.

**Table 7: Drivers of rice net profit.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **All** | **Only Poro** | **Only Tchologo** | **Only Tonkpi** |
| VARIABLES | Dependent variable: asinh(Net profit in thousand FCFA/ha) | | | |
| Gender (1=Male) | -0.53  (0.94) | -3.12\*\*  (1.37) | -0.20  (2.12) | 1.11  (1.40) |
| Training participation (1=Yes) | 2.50\*\*\*  (0.64) | 0.13  (1.10) | 3.00\*\*\*  (0.80) | 1.12  (0.95) |
| Cash transfer beneficiary (1=Yes) | -0.45  (0.90) | -2.77  (2.28) | 1.54\*\*  (0.67) | -1.85  (1.25) |
| GIC contribution  (1=Yes) | 0.51  (1.67) | 2.56\*  (1.37) | -8.15\*\*\*  (0.36) | 0.61  (2.27) |
| ln( land size cultivated) | 0.69  (0.49) | 0.69  (1.28) | 0.10  (0.53) | 1.80\*\*\*  (0.53) |
| Seed variety (1= Bouaké AM) | -1.43\*  (0.80) | -1.76  (2.38) | -0.44  (0.88) | -2.07\*\*  (0.91) |
| Villages fixed effects | Yes | Yes | Yes | Yes |
| Constant | 2.69  (2.29) | 5.16  (3.82) | 3.39  (4.40) | 3.14  (3.37) |
| Observations | 433 | 118 | 210 | 105 |
| R-squared | 0.36 | 0.42 | 0.30 | 0.38 |

Note: Net profit in FCFA/ha is defined as the total value harvest minus cost inputs and cost of credit, divided by plot size. Clustered Robust standard errors calculated at villages’ level are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Field school plots**

1. **Yields on the demonstration plots are consistently high in Tonkpi and unstable in both Poro and Tchologo (figures 5, 6 & 7 and table 8).** On average, yields are higher in the villages of Tonkpi than in Poro and Tchologo. However, by excluding villages with zero harvest, we obtained on average high yield in Poro. Yields are high in a few villages, but zero yields are also observed in some villages of Poro. Yields are high in a few villages, with low yields in some villages in Tchologo. Consistently high yields are obtained in Tonkpi, averaging over 3 tons/ha.



**Figure 5: Yield distribution on field school plots in Poro**



**Figure 5: Yield distribution on field school plots in Tchologo**



**Figure 6: Yield distribution on field school plots in Tonkpi**

**Table 8: Average yield on demonstration plots in the regions.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Poro** | **Tchologo** | **Tonkpi** | **Sign.** |
| Average yield including zero harvest (kg/ha) | 2097 | 2160 | 3188 | \*\*\* |
| Average yield excluding zero harvest (kg/ha) | 3432 | 2268 | 3188 | \*\*\* |

Note: Sign. Means significance difference between the three regions. \*\*\* Significant at 1%.

1. **Growing rice in developed lowland with clay soil dominance, with seed variety JT11 sown at the recommended date, with the application of NPK Agromax + standard, with the application of N20 + Urea standard, combined with appropriate farmers management skills, is required to achieve highest yield in our context.**. Based on the low productivity obtained in the 2019 campaign, a new pilot design involving field school and demonstration plots, monitored by extension agents was developed. Farmers participated in the demonstration plots together with the extension agents where famers learned new farming practices to improve rice productivity. The intervention was successful in 57 out 60 villages[[39]](#footnote-40) and was very informative to identify the most promising factors associated with high rice yield. Notable yield increase (table 9) is associated with the use of JT11 (793 kg/ha), growing rice in developed lowland (1456 kg/ha), clay soil (696 kg/ha), NPK Agromax (2265kg/ha), NPK Agromax + standard (2459 kg/ha), N20 + Urea (2261 kg/ha), producer’ commitment (959kg/ha). Rice yield decreased by 175 kg/ha when a delay of about a week in the recommended sowing date is observed. These factors show that rice yield could be improved largely under a production package constituted of:

*Developed lowland + clay soil + JT11 + Sowing at recommended date + (NPK Agromax + standard) + (N20 + Urea standard) + producer commitment.*

Different packages of inputs (NPK and urea) are used in the three regions, depending on a combination of: (1) availability of the products on time, (2) extent of acceptance by the farmers, (3) proof of inadequacy which may lead to remediation ex post.

**Tableau 9: Drivers of rice yield on field school plots.**

|  |  |
| --- | --- |
| VARIABLES | yield (Kg/ha) |
| Developed bas-fond (1= developed 0=Not developed) | 1456\*\*\*(505) |
| Soil type (1=clay, 0=sandy) | 696\*(347) |
| Seed variety (1=JT11, 0=Bouake AM) | 793\*\*(389) |
| Sowing type (1=Repiquage, 0=semis direct) | 584(408) |
| Number of Week delays | -175\*\*(78) |
| NPK type (1= Ordinaire NPK) |  |
| 2.NPK Agromax | 2265\*\*(945) |
| 3. NPK Agromax + Standard NPK | 2459\*\*\*(752) |
| Urea type (1= Standard Urea) |  |
| 2. N20 | 608(705) |
| 3.N20 + Standard Urea | 2261\*\*\*(751) |
| Herbicide type (1= Other) |  |
| 2. Ricer | -1038(645) |
| 3. Ricer + Other | 560(768) |
| Producer commitment (1=commitment, 0=No) | 959\*\*(465) |
| UT (Base =Poro) |  |
| Tchologo | 518(474) |
| Tonkpi | -231(928) |
| Constant | -2557(1701) |
| Observations | 55 |
| R-squared | 0.8 |

Significant at 10%, \*\* 5%, and \*\*\* 1%.

1. Christiaensen (2020). [↑](#footnote-ref-2)
2. Put differently, it simultaneously addresses labor supply and demand side constraints. [↑](#footnote-ref-3)
3. Beegle and Christiaensen (2019). [↑](#footnote-ref-4)
4. Urban rice consumption is growing rapidly in Côte d’Ivoire, with imports filling at least half of the gap. On the other hand, rice is also widely grown in northern Côte d’Ivoire, including by the cash transfer beneficiaries, though mainly for auto-consumption. Preparatory analysis of the rice market suggests that domestic rice production could be competitive with imported rice given sustained technical support and access to finance along the chain to meet the volume and quality requirements of the urban consumers. It is a considered a strategic crop by the Ivoirian authorities, which the COVID crisis has only underscored. [↑](#footnote-ref-5)
5. In an initial stage, the pilot team, in partnership with the National Agency for Rice Development (*Agence Nationale de Développement de la Riziculture*, ANADER), conducted a census of all rice processing units throughout Côte d’Ivoire focused on PUs with a processing capacity between 1 and 2 ton per hour. Smaller PUs are artisanal in nature, with limited ability to process rice that meets the quality standards of the urban markets. [↑](#footnote-ref-6)
6. With a population of 286,071 inhabitants, Korhogo is the 4th largest city in Côte d’Ivoire (2014 census). Ferkessédougou counts 120,15 people; Man 188,704 (figures based on the 2014 census). The micro-finance institute has a local branch in each of the three cities. Both Korhogo and Man are served by regular plane connections from Abidjan. [↑](#footnote-ref-7)
7. The 2019 rice campaign progress report can be accessed under the following link: <https://www.jobsanddevelopment.org/wp-content/uploads/2020/11/C%C3%B4te-d%E2%80%99Ivoire-Economic-Inclusion-into-Value-Chains-2019-Progress-Report-English.pdf> [↑](#footnote-ref-8)
8. The first-year experience showed that lowland rice was profitable and is faced with less production constraints including water control than rainfed rice. [↑](#footnote-ref-9)
9. Extension of the radius was partly also motivated by the finding that especially around Korhogo, rice cultivation tended to be more common in villages further away from the town, consistent with Von Thunen’s notion of concentric circles of activities around towns. Further away from towns, land availability tends to be larger, making the areas more conducive for land intensive crops such as rice, while off-farm employment opportunities tend to be less readily available, reducing competition for labor. [↑](#footnote-ref-10)
10. Among the repeat participating villages in both campaigns, about 58% of farmers in the 2019 campaign, continued to participate in 2020. [↑](#footnote-ref-11)
11. Payments at harvest were not conditioned on harvest outcomes or credit reimbursement (so no risk sharing imposed). [↑](#footnote-ref-12)
12. Farmers who managed to complement the fertilizer provided by the project at their own expense, and those who managed to complement the herbicide treatment with manual weeding, managed to get substantially higher yields, often exceeding the 2.5-3 ton/ha target. Anecdotal evidence of the importance of such complements is confirmed by quantitative evidence from the field plots (Appendix 2, Table 7). [↑](#footnote-ref-13)
13. Producer commitment refers to the engagement of producers in the activities of the field school plots. It is measured as a dummy variable with 1 indicating that all members of the farmer organization or a large majority of farmers have been involved in the field school plots. It takes the value of 0 if most farmers in each village have not made enough efforts to implement the training recommendation on the field school plots, and then the SPV extension worker has often been obliged to carry out the activities. In addition, this also implies that after the departure of SPV, the farmers did not take care of the field schools plots. [↑](#footnote-ref-14)
14. The compensation is calculated based on the difference between the attainable yields following intensified production and attainable yields following a traditional production model. By November 2020, the compensation corresponded to 148 producers in Tchologo for an amount of FCFA 10.9 million and 60 producers in Poro for a total amount of FCFA 4.3 million. [↑](#footnote-ref-15)
15. A lowland was deemed to be favorable to rice cultivation if the following conditions were verified: non-floodable lowland with clay texture, non-floodable lowland with clay-sandy texture (predominantly clay), or lowland with basic development. [↑](#footnote-ref-16)
16. The World Bank hired an extension services provider: the *Société de Productions Végétales de Côte d’Ivoire,* who delivered the intervention through May -October in the three regions. [↑](#footnote-ref-17)
17. Practical training was the most important component (80% of total training). It used 57 farmer field schools across all three regions where farmers were required to put in practice the acquired knowledge on the real crop cycle. [↑](#footnote-ref-18)
18. Which is very important for allowing good aeration of crops and facilitate treatments as well as good tillering. [↑](#footnote-ref-19)
19. Farmers face important barriers to following the taught practices, namely: labor availability and farmer’s capacity to pay; soil characteristics which often hamper the transplanting technique, and basic lowland development is not effective for some plots. [↑](#footnote-ref-20)
20. It may be worth noting that visiting villages for farmers to open the accounts in situ is also a high-intensive activity which may not be feasible for any microfinance institution. During this campaign, account opening activities were accelerated due to the support provided by the WB coordinators and the CIDR - CPMI-DER Consortium to COOPEC’s agent. [↑](#footnote-ref-21)
21. Farmers are not organized around rice. Thus, the project encouraged the formation of commercial rice interest groups (*Groupement d’Intérêt Commercial* or GIC), including the election of a president to serve as first contact point in the village. [↑](#footnote-ref-22)
22. The process of forming a GIC states that the GIC President selects its members based on the following criteria: good worker, agriculture is the main occupation, ability to comply with technical best practices, village dweller and age group. However, it is not clear how these criteria are enforced. [↑](#footnote-ref-23)
23. These rules include: pay the contribution fee (where applicable), participation in training, participation in GIC meetings organized by the PU, transport their output into the chosen place for the commercial operation with the PU, and carry out the handling of inputs and paddy rice when needed (unloading and loading onto the trucks). [↑](#footnote-ref-24)
24. The less-perfumed JT11 variety performed very poorly (germination rate of 48%) and was rejected. [↑](#footnote-ref-25)
25. Presence of grains of grass, pebbles, milled rice, grains of rotten rice. [↑](#footnote-ref-26)
26. These last-minute changes also imposed other problems, because the farmers were expecting to use a different seed variety and when the replacement arrived some didn’t know how to work with it. [↑](#footnote-ref-27)
27. Besides, in another 10 villages, they found that bags contained a portion of empty husks. [↑](#footnote-ref-28)
28. Documented lessons learned by the UFACOCI also point to the suitability to tie seeds provider’s final payment to germination results. [↑](#footnote-ref-29)
29. Buy paddy rice at 140 FCFA/kg, sell white rice at 350 FCFA/kg, and operate with a transformation rate of 65%. [↑](#footnote-ref-30)
30. Among producers who harvested more than 0.25 ha. [↑](#footnote-ref-31)
31. The team implemented a survey among farmers during the harvesting and selling phase, from December 2020-January 2021. See document “Raisons de la rétention du riz dans le Tonkpi ». [↑](#footnote-ref-32)
32. Consumptions needs are generally high, with family size of six or more members. Estimations indicate a need for 1,440 kg per year for family consumption. [↑](#footnote-ref-33)
33. The availability of labor varies considerably from one village to the other, and farmers have difficulties to find workers who know the agricultural techniques required for their fields. [↑](#footnote-ref-34)
34. Cacao price for the 2020 campaign was 1,000 FCFA/kg at the field. [↑](#footnote-ref-35)
35. See the CIDR Report for more details [↑](#footnote-ref-36)
36. Regarding the PU in Poro, the inability to comply with reimbursement deadlines was also because the PU manager used the loan on a purpose different from what the credit was lent for. He invested in another PU. [↑](#footnote-ref-37)
37. The objective of this would be to select farmers who can be fully committed to rice production; however, the microfinance institution proposed to select participants with a diversified portfolio of income sources to increase timely reimbursement rates. [↑](#footnote-ref-38)
38. Net profit in FCFA/ha is defined as the total value harvest minus cost inputs and cost of credit, divided by plot size. [↑](#footnote-ref-39)
39. Two villages were removed in the regression analysis due to missing values in important variables. [↑](#footnote-ref-40)