

Identification of the best management options for the rice quality processing centers: Case of Cameroon

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Abstract. A study was conducted in 2011 immediately after the installment of quality processing centers in Cameroon, Chad and Central African Republic where the CFC implemented a pilot project on rice productivity and quality enhancement. Its objective was to identify most profitable and sustainable options for the organizational and management structure for the centers to convince micro-financial institutions, local traders and processors to invest in the centers and work in coalition with shareholder smallholder farmers. The study concluded by identifying the 'Purchase, Process and Sell Option' with a combined management committee of 2 farmers and 3 traders/millers as most suitable. The study provided quantified instruments and the level of economic profitability of each section of the centers to the private operators (including farmers). It also revealed the need to develop secondary rice processing¹ as a tangible source of revenue which commonly remains underutilized in sub-Saharan Africa.

Keywords: quality processing centers, secondary processing, farmers, profitability, rice.

INTRODUCTION

The notion of ensuring food for all through rice production¹ in Cameroon dates back to 1954 with the creation of SEMRY (Société d'Expansion et de Modernisation de la Riziculture de Yagoua). To date, Yagoua is the biggest state owned rice producing cooperative in the northern part of the country. Two additional cooperatives were later created in the 1970s which significantly contributed to a national equilibrium of rice production and consumption that was reached in mid-1985 (Phelimas, 1990). However, subsequent reforms as part of a structural adjustment program with the overall concept of not subsidizing the agricultural sector, led to the collapse of these state cooperatives in

1992 (Norman and Otoo, 2003; Lostmart and Mbah, 2007; Malaa and Nzodjo, 2010). Consequently, rice production in Cameroon was left at the mercy of untrained farmers with limited or no access to input and technology. While annual per capita rice consumption increased from 12.4 kg per capita in the late 1990s to 23.0 kg per capita in 2007, production dropped from above 65,000 tons to less than 50,000 tons in the same period (FAOSTAT, 2006). To make up for the increasing production gap, in some years Cameroon imports more than 80% of its demand (FAO, 2006; Piebiep. 2008). As a reaction to globally rising rice prices which peaked in 2008, and led to riots in Cameroon ('The Rice Crisis'), the Government decided to re-visit the smallholder farmer dominated rice production sector. With financial and technical assistances from the Common Fund for Commodities (CFC) and Africa Rice Center, a four year rice value chain project on "Improving the competitiveness of

¹ Secondary rice processing is transforming hulled rice (broken or whole) into another products such as pop rice, rice flour for pastries and others

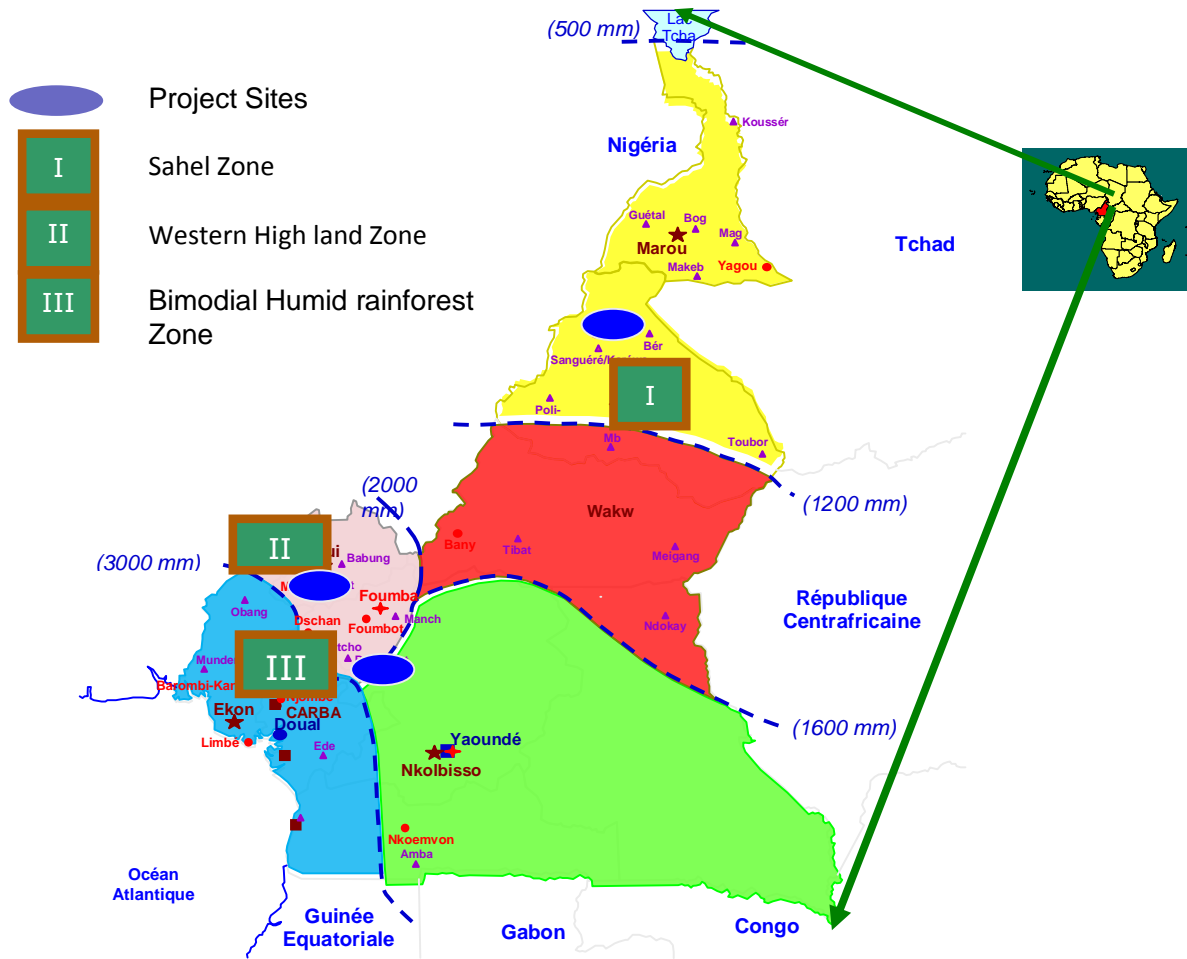


Figure 1: Project sites

Table 1. Agro-ecological characteristics of the project sites.

Project sites	Agro-ecological zones	Altitudes (m asl)	Rainfall (mm)	Mean temp. (°C)	Presence of processing center
North(Garoua)	Sahel Zone	0 – 500	500 – 1500	22 - 38	Yes
Ndop plain	Western Highlands	1200 – 1800	1500 – 2000	15 – 27	Yes
Mbam basin (Tonga)	Humid Forest	0 – 500	2500 <	22 – 29	No

rice in Central Africa” was designed and implemented as of 2008. A key component of the project was the establishment of quality processing centers with the aim to increase price and quality competitiveness of locally produced rice vis-a-vis imports.

The development of processing is likely to have a profound impact on improving food security and rural incomes and reducing dependency on rice imports in CEMAC countries through innovative interventions that promote competitive domestic rice production, transformation and marketing.

With the intention of identifying a sustainable and most efficient management model and attracting investments

from principal investors, this paper thus aims to investigate the level of profitability of the different sections of the quality processing centers.

METHODOLOGY / APPROACH

Project sites

The project was implemented in three principal rice growing basins of the country (Figure 1). Table 1 gives the agro-ecological characteristics of these rice growing basins.

Table 2. Distribution of samples.

No.	Category	Ndop plain	Garoua	Total
1	Power tiller owner	4	0	4
2	Rice seed traders	2	2	4
3	Millers	15	5	20
4	Women processors	10	10	20

Table 3. Estimated cost and profit generated from 1 ton of seed.

Items	FCFA
Purchase of seed	300,000
Transportation	15,000
Processing	50,000
Seed treatment	10,000
Quality control / labeling	5,000
Packaging	20,000
Total cost	400,000
Revenue	600,000
Profit	200,000

Sampling procedure / Data collection

The study adopted a purposive sampling technique for the selection of respondents for the study. The actors involved were: power tiller owners in Ndop plain, seed traders (Ndop and Garoua), primary processors/millers as well as secondary processors (i.e. women processing dough from rice flour in Ndop and Garoua). Given that the rice sector is not well developed in Cameroon, all categories of actors involved in rice production and processing of the project sites were involved in the sampling with the exception of women processors, of which 10 were randomly selected from each site. Table 2 shows the distribution of the samples by category of actors.

Using observatory and structured questionnaires, data was collected on all cost inquired revenues made per ha from ploughing to processing of 1 ton of raw material.

Analytical framework

Simple accounting procedures and simulation were used to calculate the different costs, revenues and profits of the different sections of the processing centers. All equipment was depreciated based on the life span of the different machines. Different options of management of the processing centers were revised to identify the best management options.

The costs of the different sections were calculated based on how the sections operate.

Seed section: Given that the center purchases and sells seed at the center, the different costs incurred are: costs

of seed, transportation, packaging, treatment, labour (processing, selling, etc), and other costs related to the depreciation of the sealing machines, the cost of the credit, etc).

Production-mechanization section: The center costs are the salaries of the operators, servicing costs, and the depreciation of the equipment.

Milling section: The costs are the procurement cost, the milling costs and the marketing cost. The total cost of each segment is calculated by summing up the cost of processing, selling, transportation, procurement, milling and marketing.

The Revenue from the center will be obtained from the sale of products produced and services rendered by the center.

In case of service rendered as ploughing of field, the revenue will be given as: Revenue = Price per hectare x Number of hectares.

In case of products sold, the revenue will be given as: Revenue = Unit price X Quantity sold.

The general formula for 'Profit - π ' is given as: $\pi = \text{Revenue} - \text{Total Cost}$

RESULTS AND DISCUSSION

The objective of the study is to provide information on the organizational functioning and the profitability of rice quality processing centers. The study covered the five sections of the processing centers in the project sites generating data that can be used by any stakeholder to have a clear visibility on the level of profitability of the centers.

Seed section

This section, which is vital for ensuring quality end-products, will purchase seed from professional seed producers (members of processing centers and others) and sell it to the paddy producers' members of the processing centers and others. A breakdown of major operations and related costs and revenue related to the section is given in Table 3. It shows a profit margin of 200,000 FCFA² per ton of seed.

² 1 \$US = 500 FCFA



Figure 2: Power-tiller



Figure 3: Paddy

Table 4. Income generated from the hiring of equipment at the center for 1 ha of land.

Items	FCFA
Ploughing	50,000
Harvesting	10,000
Total revenue	60,000
Servicing of machines/depreciation	5,000
Profit	55,000



Figure 4: Milling complex

Production-mechanization section

To reduce farmers’ labor and ensure sustainability of the equipment, the center has to hire equipment to carry out some key operations in their plots such as ploughing with power-tillers (Figure 2) and harvesting with small-scale harvesters. Table 4 lists costs and revenues that can be generated from using the equipment to plough and harvest 1 hectare of land.

Milling section

This section, which will process the primary products, will purchase rice paddy (Figure 3), mill it with the aid of the milling complex (Figure 4) and sell milled-rice and rice sub-products (Figure 5). The profitability of the milling section is as follows: Assuming the purchasing cost of 1 ton of paddy at 140,000 FCFA and a milling percentage of 60%, the estimated cost to purchase the quantity of paddy that will give 1 ton of milled rice is 234,000 FCFA. The analysis shows that such a business is profitable

with a profit margin of 76,000 FCFA plus an additional profit margin of 75,000 FCFA through the sales of the sub-products (broken rice and rice bran) (Table 5).

Rice flour section

An additional source of income in the rice value chain can come from secondary processing. Here the 100% broken grain is transformed to rice flour (Figure 6), thus adding value to small broken grains and a push to the rice-based product sector. The cost and profitability of the rice flour sector is shown in Table 6.

Rice-based products section

Processing rice-based products like biscuits, doughnuts, cakes (Figure 6) from rice flour can be an important off-farm activity that could provide income to female rice farmers and employment for the youth. The cost and

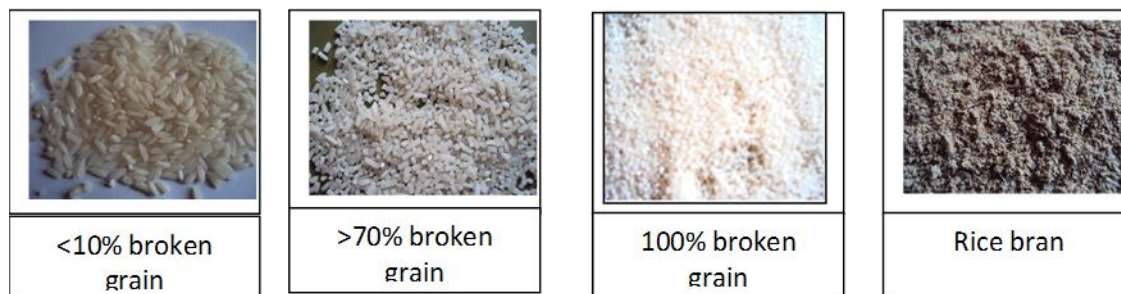


Figure 5: Rice sub-products

Table 5. Estimated profit acquired from the purchase of paddy, process and sale of 1 ton of milled rice.

Description	Amount (FCFA)
Price of paddy at farm gate	140,000
Assuming 60% extraction	234,000
Procurement cost [Labor (Buying Point), Commission; Price of one PP bag (VAT inclusive) (assuming 100 kg bag); Stitching (at buying point) (sisal ropes); Transport from SD to Main Warehouse in (WH); Loading/Unloading at Warehouse) (Labor); Cleaning of Paddy at WH (Labor); Stacking (Labor); Warehousing (approx. 6 months); Fumigation/Treatment at WH; Levy (to be paid to the District Authorities)]	15,000
Milling cost [Transportation - from WH to Milling Unit); Processing Charges (Separating, De-stoning, De-husking/Hulling, Polishing); Grading (Packing into 3 grades - Grade I, Grade II, and Grade III); Packing (50 kg bags) per kg]	5,000
Marketing cost: (Transportation - from Rice mill to market); Loading/Offloading; Security for Transportation (Escort)); Bank charges	5,000
Salary to staff + Training + Indirect costs: (Salary -3 professional staff (1 Store accountant , 2 rice processors, daily labor) per kg; Commission for Marketing; Buying point; Training of buyers, processors and maintenance);Warehousing security, Depreciation)	5,000
Total cost	264,000
Selling price of products: Whole rice (400 FCFA/kg – 70% of rice) + Large broken rice (200 FCFA/kg – 30% of rice)	340,000
Selling price of sub-products: (40%) – Small broken rice (100 FCFA/kg – 65% of rice) + Bran (50 FCFA/kg – 25%) + Husk (1 FCFA – 10%)	75,000
Total revenue	415,000
Net profit margins	151,000

profit for putting biscuits on the market from 1 ton of rice is shown in Table 7.

Activities around the processing centers

Centers are seen as business centers where all the stakeholders (farmers, traders, input dealers millers,

transformers, transporters and institutions) in the rice value chain interact with the intention of making profit for themselves, directly or indirectly contributing to the development of the rice sector of the country (Figure 7).

The strategy of the centers is based on profitable value chain approach where all sections along the chain will be considered. The different sections of the centers are:

1) The seed sector: To ensure the availability of enough



Figure 6A: Rice Flour



Figure 6B: Pie and biscuits

Table 6. Estimated cost and profit generated from the process and sale of 1 ton of flour from small broken rice.

Description	Amount (FCFA)
Broken rice + 80% extraction	125 000
Other charges (Labor; Electricity; Water; Levy - to be paid to the District Authorities, Depreciation)	25 000
Packaging + Labeling	30 000
Salary to staff + Training in marketing + Indirect costs (Salary - 4 professional staff; 1 Grinder, 1 Grader, 1 Packaging and Labeling, 1 for Marketing)	40 000
Total cost	220 000
Revenue	700 000
Net Profit margins	480 000

quality seed.

- 2) The production-mechanization sector: To intensify quality production of seed and paddy.
- 3) The milling sector: To ensure the availability of competitive milled rice.
- 4) The production of rice flour: To ensure the availability of rice flour for the processing of rice based products.
- 5) The fabrication and commercialization of rice-products, by-products and rice-based products (cakes, biscuits, etc) with the objective to develop new opportunities of value addition to the rice sector.

Broken rice grains are usually sold as animal feed. The

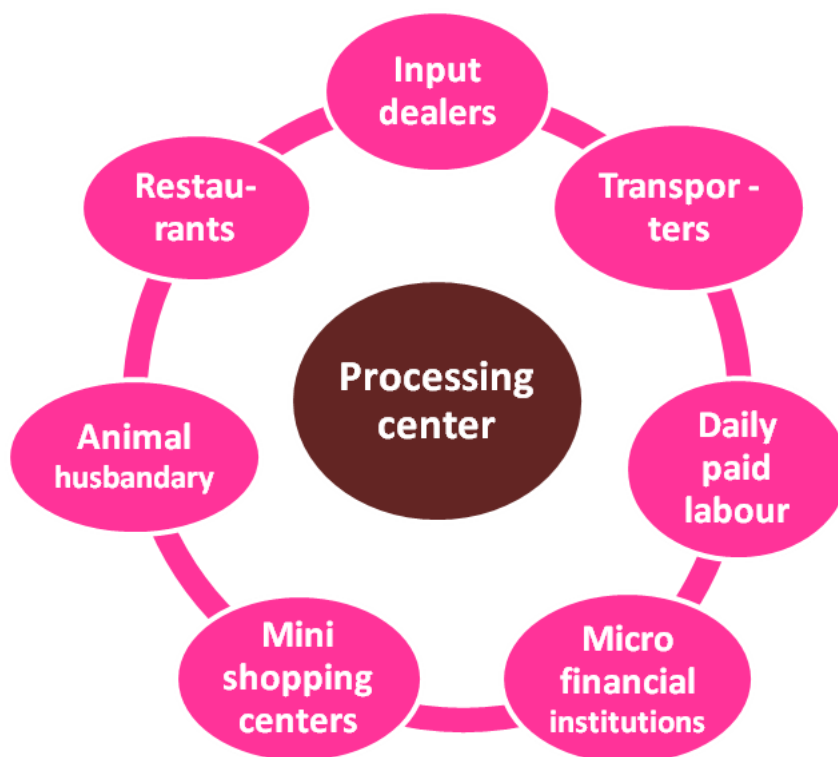
alternative of transforming it to rice flour and then into biscuits will lead to an additional profit of 480,000 and 3,500,000 FCFA respectively per ton of rice for rice flour and per ton of rice flour for rice biscuit.

Expected annual returns from a center

Given the capacity of the farmers of the centers and the project sites to produce rice on over 2000 hectares of land, each center is expected to purchase and sell 50 tons of seed per year. This quantity of seed will permit the production of over 5000 tons of quality paddy for the

Table 7. Estimated cost and profit obtained from the fabrication and sale of biscuit from 1 ton of rice flour.

Items	Cost (FCFA)
Ingredients (Sugar, Butter, Eggs, Baking powder, etc) + Additives	2,000,000
Flour	700,000
Packaging	3,000,000
Labor + Other charges	400,000
Total cost	6,100,000
Revenue	9,600,000
Net Profit margins	3,500,000

**Figure 7:** Processing center and activities around the centers

center and the other milling machines in the site.

The mechanization section, given the capacity of the machines and the availability of the farmers to hire the equipment, is expected to work on 10 ha of land each season.

As for the primary and secondary processing section, if the machines hull a maximum of 1 ton per hour and assuming that the machines run for at least 5 hours a day and 200 days a year, then the center needs a total of 1,000 tonnes of paddy a year to use the machine to its optimum capacity. The outputs of the processing section in terms of quantities of the different products and by-products are shown in Figure 8.

“Buy, process and sell” is not the only operational model for the centers. This and other options are reviewed below and assessed against most sustainable and profitable revenues.

Option I: Provide full service (buy, process and sell)

With this option, the centers purchase, process and sell primary products (milled rice and bran) and secondary products (rice flour, biscuits, etc).

Based on the already calculated profit, the total profit generated from this option based on the purchase of 1,000 tons of paddy is as follows (sum of all the profits from the different rice processing center sections):

Profit from processing and selling milled rice: (assumed 60% extraction rate)

600 tons of milled rice: $600 \times 151,000 \text{ FCFA} = 90,600,000 \text{ FCFA}$

Profit from processing and selling rice flour: Assume 100

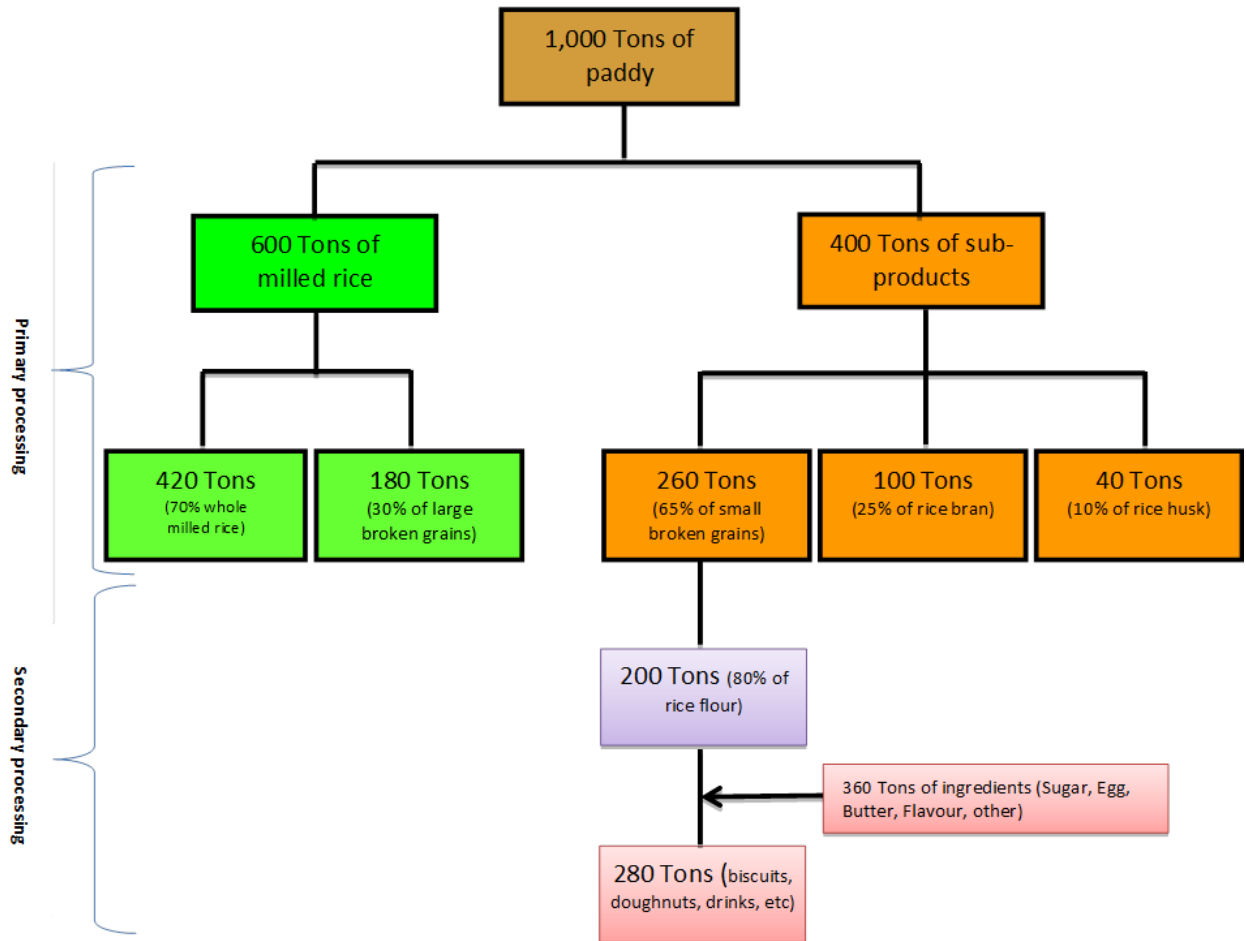


Figure 8: Breakdown of processing operations from paddy to rice biscuits

tons x 480,000 FCFA = 48,000,000 FCFA
 Profit from processing and selling rice biscuits: 100 tons x 3,500,000 FCFA = 350,000,000 FCFA

Profit of sales of rice bran: 140 tons X 10,000 FCFA = 1,400,000 FCFA
 The total profit is estimated at 490,000,000 FCA (USD 980,000).

Option II: Provide service in kind to the paddy owners

Farmers supply paddy for processing and pay 10% of the paddy for the service. This is currently done by local processors. In such case, the centers process for farmers 90% of the raw material and keep 10% for themselves. Assuming the paddy owners supply 1,000 tons for processing, 900 tons will be processed and the paddy owner will collect all the products and by-products. The remaining 100 tons left with the processing center will cover the processing costs and a profit of the center. The profit will be:
 Based on table 3, and assuming a cost of 10,000,000 FCFA covering milling, salaries and overheads for 1,000

tons plus a cost of 500,000 FCFA for marketing of 100 tons of milled rice and by-products.

Profit from the sale of 60 tons of rice from 100 tons of paddy 60 tons x 151 000 FCFA = 9,060,000 FCFA

Profit from the processing and selling rice flour: 20 tons x 480,000 FCFA = 9,600,000 FCFA

Profit from the processing and selling rice biscuits: 28 tons x 3,500,000 FCFA = 98,000,000 FCFA

Profit from the sales of rice bran: 14 tons X 10,000 FCFA = 140,000 FCFA
 The total profit is estimated at 116,800,000 FCA (233,600 USD)

Option III: Provide milling cash service to the paddy owners

Farmers pay cash to the centers for processing their paddy. In the study sites, an average price of 20 FCFA is paid per kilogram. In such case, the profit will be the difference from the revenue made from hulling and salaries

and other charges:

(1,000 tons x 20,000 FCFA) - (10,000,000 FCFA) = 10,000,000 FCFA (20,000 USD)

From the analysis of the three options, the option of purchasing, milling and selling rice and by-products is the most profitable. This option will permit the shareholder investors of the rice processing centers to receive dividends after removing the depreciations of the machines and the provisional investments and running costs.

According to evaluations, around 300,000 USD can be shared as dividends per year if the machines are used with full capacities by investing 400,000 USD. Apart from their profitability for shareholders, processing centers will create job opportunities for women and the youth:

10 young men working at the processing center
50 – 100 women producing and selling rice-based products.

In addition to all that, it is important to underline that farmers will have their own market where they can sell their rice at well-known fixed price and without any harassment and receive immediate cash and returns at the end of the processing campaign.

Operating modes of centers

Without an appropriate operating mode, the expected profit cannot be attained. The different management strategies commonly used in the Cameroon rice sector are:

Farmer-self management: Farmers produce the paddy, process and sell. This traditional operating mode is likely to fail. Over 90% of milling centers exclusively managed by farmers do not survive two rice seasons. This is due to the fact that they are not business men and they do not know where to sell the finished products.

Miller / Trader management: Through this operating mode, millers and traders buy paddy, process and sell. While this group has usually no difficulties in operating and managing such a rice processing center, the distrust of farmers usually lead to a very limited supply of paddy that forces these centers to inefficiently operate below their capacity.

Based on these difficulties faced by the different actors, the mode of operating of the CFC financed centers are a combination and can be labeled as a “Miller-Trader-Farmer coalition”, where each group is invested in the processing center and takes a vested interest in its optimal operation and management. After six months of operations it can already be observed that rice processors and rice traders invested in the processing centers develop market opportunities and adequately manage operations, while stakeholder farmers continue

to preferentially supply the centers with quality raw material as well as gaining capacity development from the centers.

The selected form of organization reconciles a partnership development between all stakeholders with the objective to generate profits. At village level, it helps to promote officially registered private initiatives that can contribute to the structuring of the rice-value chain.

These centers will get backstop from the platforms of stakeholders (policy makers, researchers, farmers, micro-financial institutions, etc) that will play an advocacy role and help to create a conducive environment for appropriate use of local rules and regulations. At the same time they will protect centers from abusive or illegal interventions of undue tax collectors. Thus, the centers have to be managed by a committee comprised of at least 5 members (based on proportion of shares, 2 members from a farmer officially registered group, association or union and 3 members from traders and processors).

All farmers' activities around the pilot sites shall be channeled to the quality processing centers and organized by their groups, associations or unions. These activities will cover: i) provision of seed; ii) provision of fertilizers and pesticides when needed; iii) commercialization of seed and paddy and iv) provision of women farmers in rice flour. That means centers should be seen as vectors for the structuration of the rice value chain including the reinforcement of farmers' capacity and organizations.

CONCLUSION

The establishment of pilot rice processing centers can add value to rural rice production. These centers are expected to evolve into fully fledged business centers where all actors along the rice value chain will meet and interact (Producers, Traders, Input dealers, Platform members, Research, and Extension). Through these centers approximately 10 permanent employments can be created among which five will be for women. Indirect employments within the center can be up to 100. These comprise of labor for loading and off-loading 1,000 tons and Transportation of 1,000 tons. Centers will pay cash to farmers for their paddy, which is considered as a distinct advantage to farmers. At the end of the season dividends will be shared to shareholders based on their shares. In addition, the model will help in the restructuring of the rice value chain into at least three major sections: Production, Processing and Commercialization sections. Other indirect activities (restaurants, input dealers, etc) will be generated around the processing centers. If well-managed, the centers will be able to generate shares profit of over 300,000 USD per year.

In summary, the project on “Improving the competitiveness of rice in Central Africa” was a decisive

step towards food security.

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