

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

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**Abstract.** This study was conducted in 2011 immediately after the installment of the quality processing centers in the three CFC Project country members (Cameroon, Chad and CAR). Its objective was to identify the most profitable and sustainable options for the quality processing centers that will further serve as decision tool to convince traders and processors to take shares in the running costs of the centers and to accept to work in coalition with smallholder farmers. The study concluded by proposing the 'Purchase, Process and Sell option' with a combined management committee of 2 farmers and 3 traders/millers. The study has enabled to put in the hands of the private operators (including farmers) quantified instruments that give the level of economic profitability of each segment of the rice value chain. It has also showed the need to develop the secondary processing as tangible source of revenues and employs which is unfortunately not well utilized in sub-Saharan Africa.

**Keywords:** Quality processing centers, secondary processing, farmers, profitability, rice.

## INTRODUCTION

Ensuring food for all through rice production in Cameroon date back to 1954 with the creation of SEMRY (Société d'Expansion et de Modernisation de la Riziculture de Yagoua). Yagoua is the biggest rice state own cooperation in the Northern part of the country. Two others were later created in the 1970s and rice production and consumption breakeven in the mid-1985. However, the reforms of the structural adjustment program with the concept of not subsidising the agricultural sector, led to the collapse of these state cooperation (Malaa and Nzodjo, 2010). Thus, rice production was left at the mercy of untrained farmers who used rudimentary tools to produce non-competitive rice. At this level, while per capita consumption increased from 12.4 in the late 1990s to 23.0 tons in 2007, productions dropped from above 65,000 tons to less than 50000 tons in the same period (FAOSTAT, 2006). To make up for the consumption, the country resorted to importations of as

much as more than 80% of its demands (Piebiep, 2008). However, since rice prices reached its peak in 2008, resulting in riots in Cameroon ('The Rice Crisis'), the Government decided to re-launch the rice sector.

With financial and technical assistances from the Common Fund for Commodities (CFC) and Africa Rice Center, a four years rice value chain project on "Improving the competitiveness of rice in Central Africa" was put in place in 2008. The project was designed around quality processing centers.

It is expected that the development of processing centers will likely have an in-depth impact to improve food security and rural incomes and to reduce dependency on rice imports in CEMAC countries through innovative interventions that promote competitive domestic rice production and marketing.

To get all the rice stakeholders to be involved in the management of these centers, there was a need to carry

**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

**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

out a feasibility study of the rice sector. With the intention of getting a sustainable management option and attracting investment from all stakeholders, this paper thus aims to inform about the level of profitability of the major five sectors that the center will be made of.

## METHODOLOGY

### Project sites

The project was implemented in three sites from the different rice growing basins with respect to the agro-ecological zones (Table 1).

### Sampling procedure / data collection

The study adopted a purposive sampling technique for the selection of respondents for the study. The actors involved were: the power tiller owners in Ndop plain, the seed traders (Ndop and Garoua), primary processors/millers and secondary processors (women processing dough from rice flour in Ndop and Garoua). Given that the small scale rice sector is not well developed in Cameroon, all the actors involved in the site, were involved in the sampling but for the women processors, 10 among them were selected from each site. Table 2 shows the distribution of the samples by category of actors.

Using observatory and structured questionnaires, data were collected on all the cost centres and revenues made per ha for ploughing and processing of one ton of raw material in the other sectors.

### Analytical framework

Simple accounting procedures and simulation were used

to calculate all the cost centers of the five sectors. Equipment of all the sectors were depreciated based on the life span of the different machines. Different options of management of processing centers were revised to get the best option. The costs of the different sectors were calculated based on how the sectors operate.

### Seed sector

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 relate to the depreciation of the sealing machines, the cost of the credit, etc).

### Mechanization sector

The centers costs are: the salaries of the operators, servicing costs, and the depreciation of the equipment.

### Milling sector

The costs are: the procurement cost, the milling costs and the marketing costs.

The total cost of each sector is given by the sum all the costs. The general formula for 'Profit -  $\pi$ ' is given as:  $\Pi = \text{Revenue} - \text{Total cost}$

## RESULTS AND DISCUSSION

The objective of this study is to provide information on the functioning and the profitability of quality processing centers. The study covered the five major segments of the processing centers in the project sites giving opportunities to all interested stakeholders to have a visibility on the functioning and the profitability of each segment.

**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

**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

### Seed sector

This sector, which is very vital for the end-products, will purchase seed from professional seed producers and sell it to the paddy producers. A breakdown of major operations related to the sector is given in [Table 3](#). It shows a profit margin of 200,000 FCFA<sup>1</sup> per ton of seed.

### Production-mechanization sector

To reduce farmers' labor and ensure sustainability of the equipment, the center has to hire equipments to carry out some key operations in their field plots such as ploughing with power-tillers and harvesting with small-scale harvesters. [Table 4](#) shows the minimum income that can be generated from using the equipment to plough and harvest one hectare of land.

### Milling sector

This sector, which is the core of the processing center, will purchase paddy, mill it and sell the milled-rice and rice by-products. The profitability of the milling sector is as follows: Assuming the 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 a ton of milled rice is 234,000 FCFA. The analysis shows that such business is profitable with a profit margin

of 76,000 FCFA plus an additional margin of 75,000 FCFA for the sales of the sub-products (broken rice and rice bran) ([Table 5](#)).

### Rice flour sector

A new path in the rice value chain is to ensure the availability of the rice flour. This will add value to the 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](#).

### Fabrication of rice-based products

Processing rice-based products (like biscuits, doughnuts, cakes, drinks, etc) from rice flour is an important off-farm activity that will provide income to female rice farmers and employment for the youth. The cost and profit for putting biscuits on the market from 1 ton of rice flour is shown in [Table 7](#).

Broken rice grains are usually destined to feed animals but further transforming it to rice flour and biscuits will give 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.

### Activities around the processing center

The processing center will become a full business center

<sup>1</sup> 1 \$US = 500 FCFA

**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

**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

where people will interact by selling and buying different items like agricultural inputs, foods, house equipment, small-scale logistics, and by facilitating the access to credit, etc. These will enable the creation of permanent and temporal job opportunities in the localities. This is summarized in [Figure 5](#).

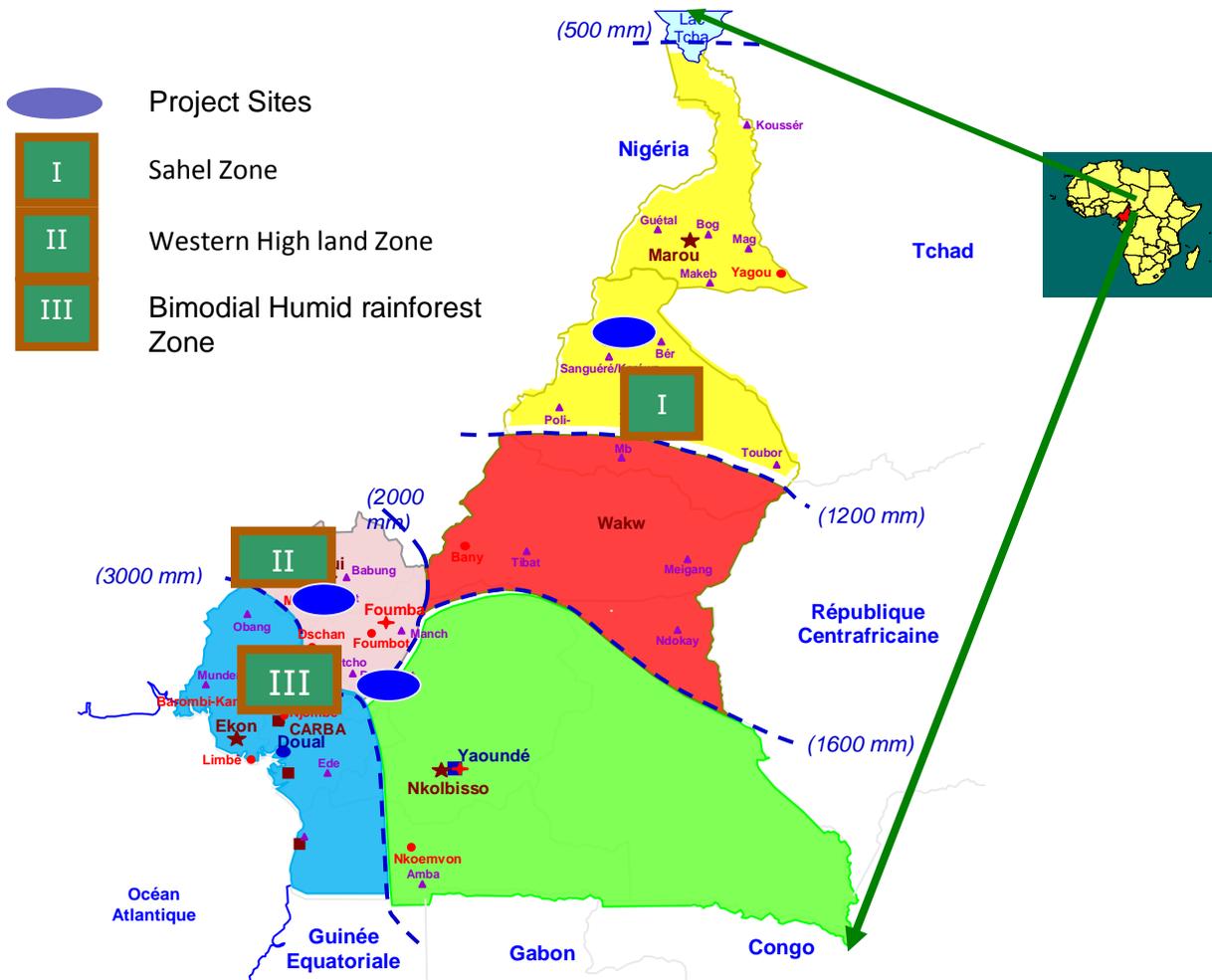
Centers are seen as business centers where all the stakeholders (farmers, traders, input dealers millers, transformers, transporters and institutions) in the rice

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

1. The seed sector: To ensure the availability of enough quality seed.

**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 1.** Project sites.

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.

**Expected annual returns from a center**

The seed sector is expected to purchase and sell 50 tons of seed per year.



Figure 2. ???????

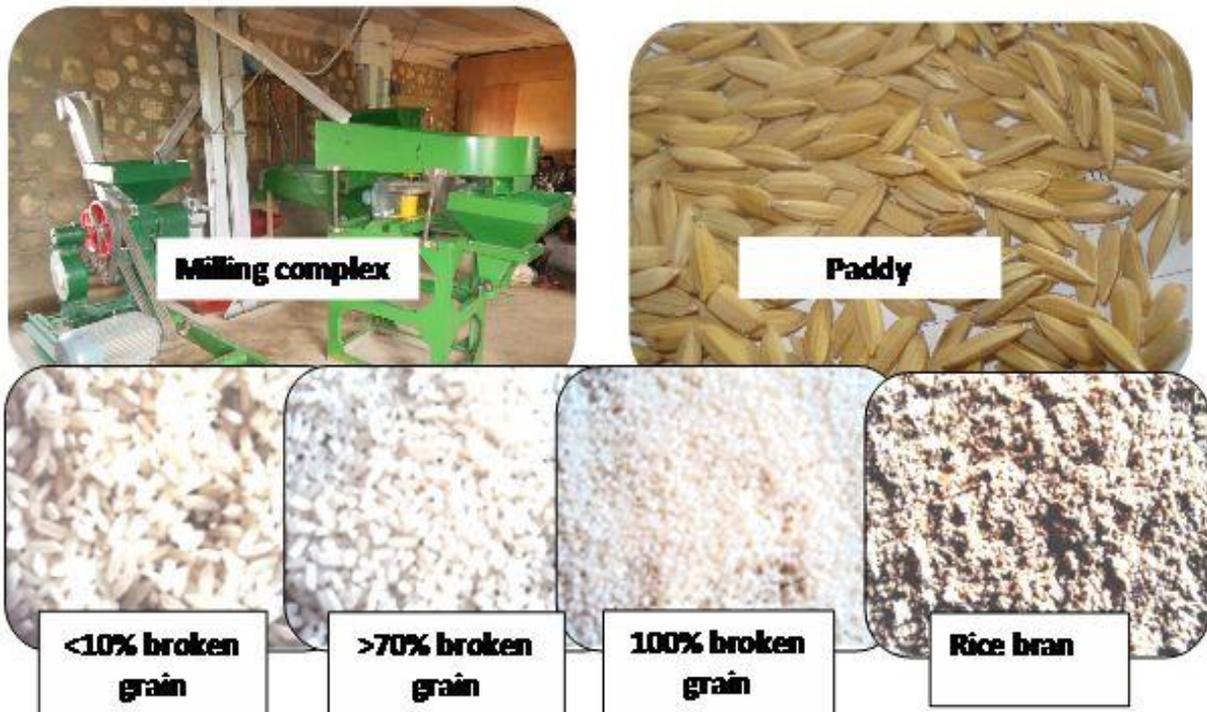


Figure 3. ?????

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 year.

As for the primary and processing sectors, if the machine hulls a maximum of 1 ton per hour and assuming that this machine runs for at least 5 hours a day and 200 days a year, then the center needs a total of 1,000 tons of paddy a year. The outputs of the milling sector in terms of quantities of the different products and by-products are shown in Figure 6.

Purchase, process and sell is not the only option that can operate in the centers. However, this and other options are reviewed below as to get the 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 sectors):

- (i) Profit from processing and selling milled rice:  
Assume 60% extraction imply 600 tons of milled rice:  $600 \times 151,000 \text{ FCFA} = 90,600,000 \text{ FCFA}$
- (ii) Profit from processing and selling rice flour:  
Assume 100 tons  $\times 480,000 \text{ FCFA} = 48,000,000 \text{ FCFA}$



Figure 4. ?????

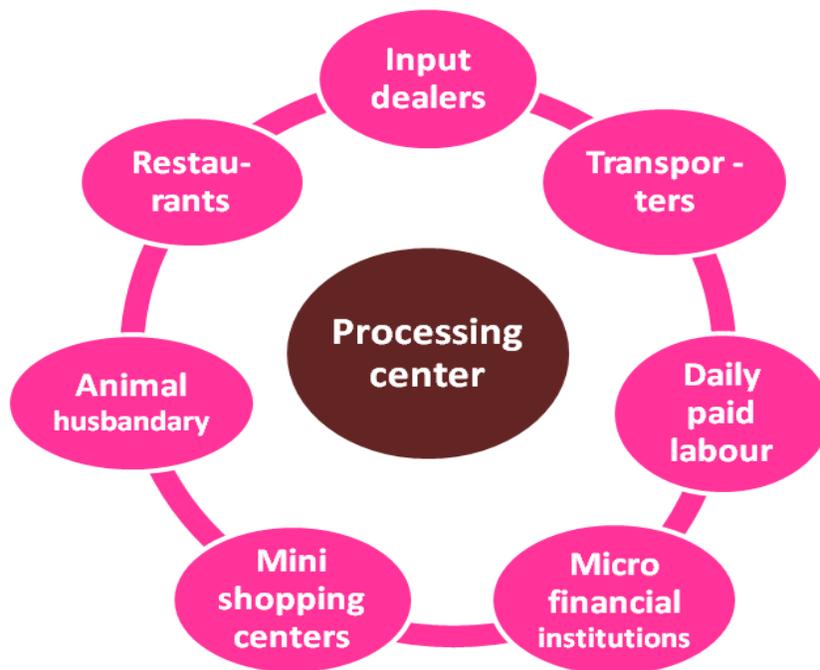


Figure 5. Processing center and activities around the centers.

(iii) Profit from processing and selling rice biscuits:

$100 \text{ tons} \times 3,500,000 \text{ FCFA} = 350,000,000 \text{ FCFA}$

(iv) Profit of sales of rice bran:

$140 \text{ tons} \times 10,000 \text{ FCFA} = 1,400,000 \text{ FCFA}$

The total profit is estimated at 500, 550, 000 FCA (\$US 1,001,100).

**Option II: Provide service in kind to the paddy owners**

Farmers bring 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.

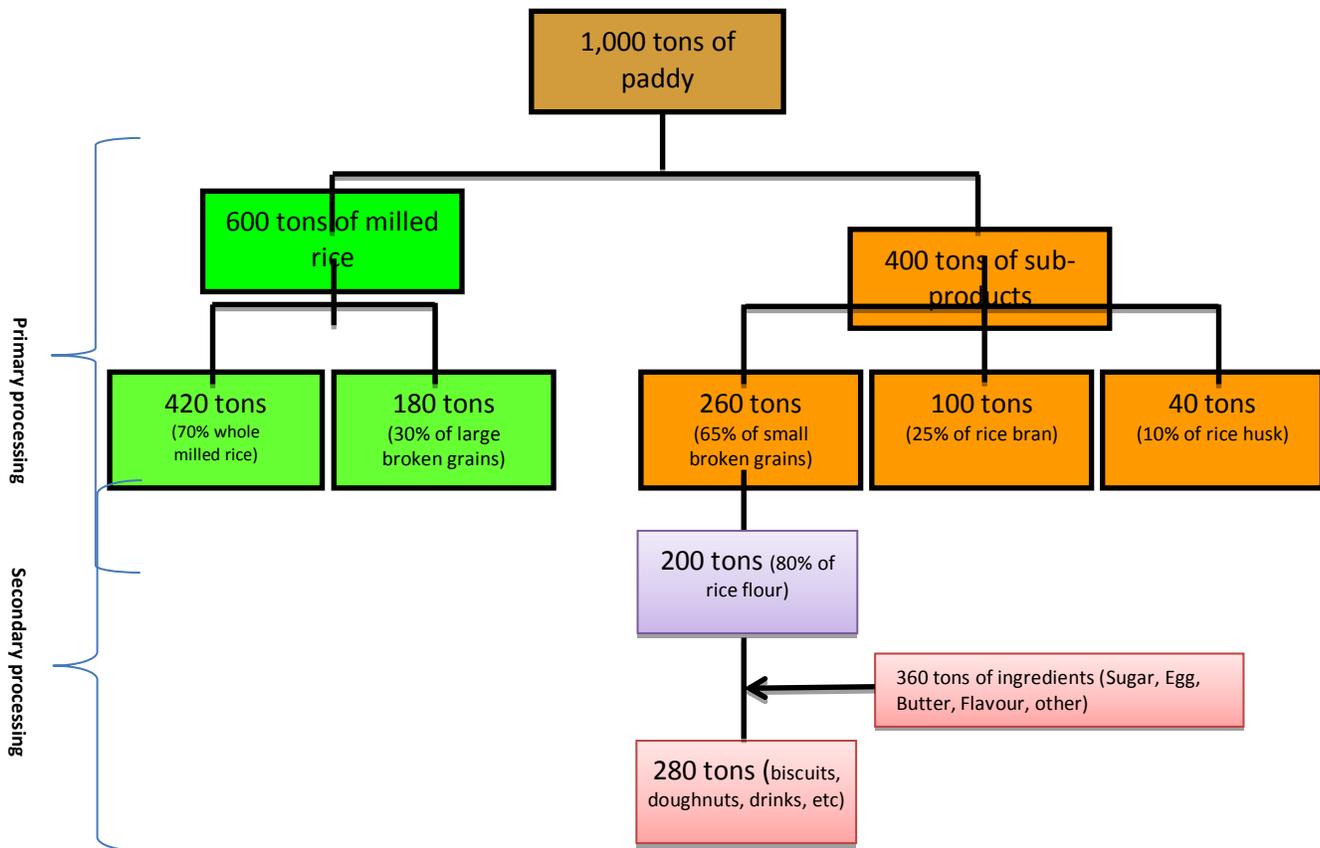
Assuming the paddy owners bring in 1,000 tons for processing, 900 tons will be processed and the paddy owner will collect all the products and by-products. Then, 100 tons that have been left with the processing center will cover the cost and profit of the center.

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:

(i) Profit from the sale of 60 tons of rice from 100 tons of paddy:

$60 \text{ tons} \times 151,000 \text{ FCFA} = 9,060,000 \text{ FCFA}$

(ii) Profit from the processing and selling rice flour:



**Figure 6.** Breakdown of processing operations from paddy to rice biscuits.

20 tons × 480,000 FCFA = 9,600,000 FCFA

(iii) Profit from the processing and selling rice biscuits:

28 tons × 3,500,000 FCFA = 98,000,000 FCFA

(iv) Profit from the sales of rice bran:

14 tons × 10,000 FCFA = 1,400,000 FCFA

The total profit is estimated at 121,900,000 FCA (\$US 118,060,000)

### **Option III: Provide milling cash service to the paddy owners**

Farmers pay cash to the processing centers. 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:

$(1,000 \text{ tons} \times 20,000 \text{ FCFA}) - (10,000,000 \text{ FCFA}) = 10,000,000 \text{ FCFA}$  (\$US 20,000)

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 co-sharers to get dividends after removing the depreciations of the

machines and the provisional investments and running costs.

According to evaluations, around 300,000 \$US can be shared as dividends per year if the machines are exploited in their full capacities by investing 400,000 \$US. Outside the profitability, processing centers will create job opportunities for women and the youth:

- (i) 10 young boys working at the processing center
- (ii) 50 to 100 women producing and selling rice-based products

In addition to all that, it is important to underline that farmers will sell their products and get immediate cash and returns at the end of the processing campaign.

### **Operating modes of centers**

Without a good operating mode, the expected profit cannot be attained. The different management strategies used in the rice basin are:

**1) Farmer-self management:** Farmers produce the paddy, process and sell. This operating mode does not present the best as over 90% of such run milling centers

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.

**2) Miller/trader management:** Through this operating mode, millers and traders buy paddy, process and sell. These groups of operators, given the fact that they are businessmen, present a better profile but they often cheat the paddy producers and thus, end up not getting enough raw material for their milling machines most of the time.

Based on these difficulties faced by the different actors, the mode of operating of the centers will be a combination of miller-trader-farmer coalition. This seems to be the most appropriate operating mode. It is expected that rice processors and rice traders will develop market opportunities while farmers' organizations will provide the centers with quality raw material as well as gaining capacity development from the centers.

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

These enterprises will get backstop from the platforms of stakeholders 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. Thus, the centers have to be managed by a committee comprised of at least 5 members (2 members from a farmer officially registered enterprise, association or union and 3 members from traders and processors).

All farmers' activities around the pilot sites should be channeled to the quality processing centers and organized by the enterprises. 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 the quality processing centers will give value to the rice production. These centers are expected to become business centers where all actors along the rice chain will meet (Producers; Traders; Input dealers; Platform members; Research; Extension). Through these centers, 10 permanent employments will be created among which five will be for women. Indirect employments within the center can be estimated at about 100. These comprise labor for loading and off-loading 1,000 tonnes, and transportation of 1,000 tonnes. Centers will pay cash farmers for their paddy. At the end of the season, calculations will be done to determine the

total amount to be shared after. In addition, they will help to structure the rice value chain into: Production, Processing and Commercialization segments. 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 \$US 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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