COTE D’ IVOIRE
YOUTH REINSERTION OPPORTUNITIES STUDY

VALUE CHAIN ANALYSIS

CASHEW

October 2006
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CASHEW
VALUE CHAIN ANALYSIS FOR CASHEW INDUSTRY

UNDERSTAND BUSINESS SYSTEM

World Production of Cashew Nuts

- Production has increased fivefold between 1961 and 2005

From less than 300,000 tons in 1961, the world production of cashew nuts has increased till mid 70’s and then has decreased or stagnated till late 80’s. After that, there was a constant increase to reach today 1,600,000 tons (Figure 1).

- Cashew crisis in Eastern Africa

In 60’s and 70’s the first producing area in the world was East Africa with about 60% - 70% of the total production. Between 1975 and 1990, a drastic decrease was due to several factors (biology, agronomy, social and economy).

Since the early 1990s, production has recovered and has continued to increase steadily over the last decade (Figure 2).
- **Emergence of the three main producing countries: India, Brazil and Vietnam**

Production of cashew nuts in India and in Brazil has increased regularly during the last 4 decades and these two countries are now producing respectively 350,000 tons and 250,000 tons (Figure 3).

![Figure 3: production of cashew nuts in India and Brazil](image)

Vietnam has recently joined these two main players with a national production of about 300,000 tons.

- **Côte d'Ivoire is now the fourth producing country in the world.**

Like in Vietnam, the increase of the cashew nuts production in Côte d'Ivoire was a drastic and spectacular one and the country is now producing 200,000 tons (Figure 4).

![Figure 4: production of cashew nuts in Vietnam and Côte d'Ivoire](image)
In the same time, West Africa becomes the first producing area in the world with 40% of the total world production.

**Seasonal and geographical repartition of the world production of cashew nuts**

Cashew nuts are produced all around the world in all tropical or sub tropical regions and the productions have a seasonal repartition related to the latitude and longitude of the producing countries:

- **January to march**: Indian and Vietnamese crops;

- **March to June**: West African crops, from the East (Nigeria) to the West (Guinea Bissau);

- **September to December**: East African, Brazilian and South Asian crops.

This repartition determines the dynamics of the world nuts market and the stock constitution for processing:

- India (and at a lesser degree Vietnam) is processing stocks :
  - Firstly from its own production
  - Secondly stocks bought in West Africa
  - Thirdly stocks bought in East Africa and South Asia

- Indian processors are managing 3 to 4 months stocks of raw cashew nuts

- African and Brazilian processors need to manage 10-12 months stocks of raw cashew nuts

**The processing industry of the cashew nuts**

Related to the production of the cashew nuts, the main facts of the history of the processing industry are the following:

- **Collapse and recovery of the Tanzanian and Mozambican cashew industries**

In 1975, Mozambique and Tanzania were marketing more than 30% of the world production of cashew kernels. Their processing facilities were mainly large size units using semi automatic process from the Italian company OLTREMARE.

During the 80’s and 90’s, the cashew nuts processing industries have almost completely disappeared in Tanzania and Mozambique.

These industries are now recovering following incentives from the Government in favour of the local processors. The local processing units are all using Indian techniques of processing.
- India, Vietnam and Brazil are processing 99% of the cashew nuts produced worldwide

These three countries have developed a local processing industry in parallel with the increase of their raw material production. All these countries have strong policies to protect and promote their local processing industries.

India is today:

. number one for the raw cashew nuts production (400,000 tons)
. number one for the imports of raw cashew nuts (600,000 tons), mainly from East and West Africa
. number one for the cashew processing capacity (more than 1 million tons)
. number one for the production of cashew kernels (220,000 tons)
. number two for cashew kernels consumption behind the USA (100,000 tons)

Brazil is processing its entire national production of raw nuts and is exporting 90% of the kernels production, mainly to the USA.

Vietnam stopped its raw nuts exports in India more than ten years ago by developing a highly competitive local industry.

Brazil imports of raw nuts are very rare when Vietnam used to import some quantities from Africa or Southern Asia.

- There is no national processing industry in West Africa.

In spite of some former attempt to develop national industries, Côte d'Ivoire and all West African countries are exporting 99% of their raw cashew nuts production toward India or Vietnam.

Main characteristics of the cashew nuts processing industry
- **Composition of the cashew nut and yields of the process**

A cashew nut is made up of two main components, the shell and the kernel.

The kernel is covered by a thick reddish skin or testa.

The honeycombed shell contains a phenol like resin called Cashew Nut Shell Liquid (CNSL).

During the processing, the average yields obtained from the nuts are (in percentage of the weight of the nuts, Figure 5):

- Kernels = 20 – 22 %
- Kernel wastes = 3 – 6%
- Skins = 1.5 – 3 %
- Shells = 70 – 75 %

The kernels can be of different sizes or colors, they can also be broken into pieces of different sizes. All different types of whole kernels or pieces are called grades. The cashew nuts processing industry is marketing between fourteen and twenty five different grades of kernels. The better prices are obtained with the bigger sizes of the whole white kernels.

A 5,000 tons processing unit should produce about 1,000 – 1,100 tons of kernels per year.

Apart from the kernels, the others products are by-products which can be used, processed and marketed. It can be extracted 25-35 % of CNSL from the shells (by pressing). All the by-products represent possible additional revenue and profit for a processing unit.

- **The different stages of the process**

The successive stages involved in the processing of the cashew nuts into marketable kernels are:

- Cooking of the nuts
- Shelling of the nuts
- Drying of the kernels
- Peeling of the kernels
- Grading of the kernels
- Packing of the kernels

The whole process usually lasts about 5 to 7 days.
- **The Industry requirements**

All costs or other figures have been acquired through personal experiences in cashew processing or during interviews of Indian processors. The unit costs refer to the quantity of raw nuts processed and are evaluated in CFA / kg of nuts (For Indian processors, the unit costs are in USD / bag of raw nuts, a bag being 80 kg of nuts).

  . **High labor intensity**

For a large size processing unit running 275 working days a year, the ratio (number of worker / ton processed per year) is about 0.25 – 0.30.

The ratio (workers / ton processed per day) is around 75.

A 5,000 tons processing unit should employ 1250 – 1,500 workers.

  . **Low level of required skills**

Most of the operations of the processing of cashew nuts are manuals and very repetitive. They need patience and concentration but they do not need special education or training.

  . **Low level of investment in equipment**

The equipment of a cashew nuts processing unit can be of an extreme simplicity. Thus, the costs of the investment in equipment for a 5,000 tons processing unit is about USD 750,000 - 1 million.

  . **Important surface required**

The erection of a processing unit can require a very important surface to install all working sections and storage facilities.

For a 5,000 tons processing unit:

  . Storage capacities for the raw nuts = 2,500 – 3,000 m2
  . Surface required for working section = 5,000 m2

  . **The constitution of the stock of raw nuts and its financial implications**

A cashew processing unit is supposed to be run on a whole year basis (although this assumption can be discussed).

In Côte d’Ivoire, a processor should buy a stock of raw nuts during the harvest season, from March to June, and is going to process it for at least 10-11 months. Each year, this processor must have a large amount of money for this stock purchase. He can take the money on its own resources but, more often, he is going to look for banking facilities.
The credit line or revolving obtained from a local bank (or more probably from an international bank) is going to generate high financial costs.

For instance, the CFA 1 billion necessary for a 5,000 tons unit (with an unit price of CFA 200 / kg of raw nuts) can cost CFA 10 to 30 / kg of nuts or 50 to 150 millions for the whole year campaign.

Indian processors have not similar problems as they used to work on three different stocks, the nuts bought in India, then the nuts purchased in Western Africa and finally the stocks they acquire in Eastern Africa.

Operating costs

We are making the distinction between the variable costs and the fixed costs. The variable costs are proportional to the quantity of nuts processed when the fixed cost are independent of this quantity. All costs are depending on the efficiency of the process (quantity of nuts processed per unit of time).

The variable costs can be estimated about CFA 100 – 150 / kg of raw nuts. They are shared between wages (70 % - 80 %), packing materials (10 % -20 %) and others inputs and utilities (5 % – 15 %) but without all financial costs.

The fixed costs are about CFA 25 – 75 / kg of raw nuts without depreciation costs and all taxes.

The total costs are about CFA 125 – 225 / kg of raw nuts processed and an objective for a new operating large size processing unit could be CFA 175 / kg of nuts.

The fixation of the price of the raw cashew nuts

- The kernels sales

The cashew nuts processing industry produces about twenty different grades of kernels among which the most expensive are the white whole kernels.

All kernel grades have different quotations on the international market but usually the reference price is the price of the grade W320 FOB India (W320 = white whole kernels with about 320 kernels / lb).

An estimate of the price for all the grades produced by a processing unit should be between 80% and 90% of the W320 price.

- The links between the kernels price and the raw cashew nuts price.

The table 1 below summarizes the relations between the price of the raw nut and the price of the processed kernels.

The world price of the grade W320 is available weekly on commodityindia.com or with any broker or importers. This price is generally fixed on a FOB India basis and in USD / English pound (lb).
On September 16th, this price was USD 2 / lb. Using the exchange rate of the US Dollar versus CFA and the value of one English pound (0.45359 kg), we obtain the price of the W320 in CFA / kg.

For all grades of kernels produced, we would have an average price of 1950 CFA/kg.

The yield of the process from the nuts to the kernels is between 20% and 21%.

An estimate of the costs of the process is CFA 175 / kg of nuts processed.

The purchase of the stock of nuts for the whole year leads to financial costs which are about CFA 10 - 30 / kg of nuts depending on the size of the stock and on the banking conditions.

The expenses for the trucking of the kernels to the port and for being FOB are about CFA 10 - 20 / kg of nuts depending on the distance between the factory and the port, the duration of the trip, the harassment on the way, the cost of the forwarding company. In Côte d'Ivoire, these costs have increased these last years due to the political problems (for instance CFA 0.8-1 millions for trucking Korhogo-Abidjan; CFA 0.4 millions for being FOB).

These expenses for the processors can even be more if the price of the kernels has been established on a CIF basis as it is usually done for smaller producers of kernels in Western Africa. In this case, the CIF price is the same than the FOB price but the processors has to pay the freight charges. It is a kind of discount which is applied on an Ivorian processor.

Considering all these costs, the processor can easily assess the maximum price of the nuts for its factory. He can even built a simulation depending on the possible evolution of the two main parameters on which he has no power, the exchange rate of the US Dollar and the W320 price.

In our table, we can see that the price should be about CFA 180 – 200 / kg (depending on the yield of the process). We have not taken into consideration the costs required for the purchase of the nuts but these costs can be high, depending on the organization the processor need to supply its factory.

The final decision will must be taken if there is some possible profit. In this case, if the farm gate price of the raw nuts is about CFA 250 / kg, the sole alternative for the processor will be to close its unit.
Table 1: Raw Cashew Nuts price fixation for the processors

<table>
<thead>
<tr>
<th>Speculation</th>
<th>FOB Price India</th>
<th>W320</th>
<th>USD/lb</th>
<th>W320</th>
<th>CFA/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales price all grades confounded</td>
<td>85% of the W320 price</td>
<td>520 USD/lb</td>
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<tr>
<td>Yield of the process</td>
<td>20% or 21%</td>
<td>1,040 CFA/lb</td>
<td></td>
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<tr>
<td>Nuts valorization</td>
<td>390 CFA/kg of nuts or 409</td>
<td>2,293 CFA/kg</td>
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</tr>
</tbody>
</table>
| Financial costs on the stock of nuts | 20 CFA/kg of nuts | 20%
| Transit costs for kernels (trucking – FOB) | 15 CFA/kg of nuts |
| Process costs | 175 CFA/kg of nuts |
| Maximum price for nuts at the factory | 180 CFA/kg of nuts or 199 |
| Costs on purchase of the nuts | 15 CFA/kg of nuts |
| Processors profit | ? ? |

The influence of the quality of the nuts: importance of the outturn

The price of the cashew nuts depends on the quality on the nuts. The nuts being purchased for their processing into kernels, their quality is linked with their ability to give the better yield in kernels and the biggest size of kernels.

This quality is usually assessed through the parameters which are giving indications on the potential yield in kernels. These parameters are:

- The number of nuts / kg,
- The outturn.

The lower the number is, the better is the ability of the nuts to give big kernels.
This parameter is an Indian assessment of the nuts quality. The outturn is expressed by the ratio pound of kernels / bag of raw nuts (one bag is 80 kg of nut). An average value of the outturn for the Ivorian nuts is 48. It means that you can expect to obtain 48 pounds of kernels per bag of raw nuts.

The outturn can be expressed in a percentage (using the weight of a pound in kg and the weight of a bag). For instance, an outturn of 48 is equivalent to a percentage of 27.2% (weight of kernels / weight of nuts).

The outturn is measured after an appropriate sampling of a batch of nuts, the opening of the nuts and the weighing of the good kernels with their skin.

We must precise that the outturn is not the yield of the process as the kernels considered in the outturn are kernels with their skin and their initial moisture. The differences between the outturn (in percentage) of a particular batch and the yield of the process of this batch can be about 6-10% depending on the efficiency of the process.

The price of the raw nuts is usually linked to their outturn, the higher the outturn is, the higher the price is. If the outturn for Ivorian nuts is about 48, it could of 52 in Bissau Guinea or in Tanzania. Inside Côte d’Ivoire, the nuts harvested in the Bondoukou Region have often better outturn than in other Regions.

- **Price of the cashew nuts in the main producing countries**

The prices of the cashew nuts in various countries are depending on their quality and on the availability of these nuts for the local processors. For instance, in the first half of 2006 the value of the prices were between 200 and 280 CFA / kg in Vietnam, between 200 and 500 CFA / kg in India, between 125 and 225 CFA / kg in Côte d’Ivoire.

The best prices are often observed in India where the local demand is particularly high.

**The consumption of the cashew kernels**

About 360,000 tons of cashew kernels are produced annually and the main producers are:
- India (215,000 tons)
- Vietnam (85,000 tons)
- Brazil (55,000 tons)

The main consuming countries are the USA (100,000 – 150,000 tons), India (100,000 – 125,000 tons), Europe (50,000 - 75,000 tons) and the emerging countries (Eastern Europe, Middle East and Asia).

**Trends in the World consumption of cashew kernels**

There is a constant growth of about 5-10% per year of the world consumption of cashew kernels. Between 2002, 2003 and 2004 the growth in cashew imports from India, Vietnam and Brazil should has been about 15% - 20%.
But, since mid-2005, there is a negative growth in the demand of cashew kernels in the USA. This trend seems to be linked to the high availability and the price fall of the almond which dominates the tree nuts market (especially in the US market).

Some recent marketing campaign in the USA emphasize on the nutritional quality of the cashew kernels (low fat content, low level of cholesterol, high carbon hydrate content, source of vitamins B and K).

The cashew kernel is also one of the most appreciate nuts whereas its unit price is among the lowest for this kind of product (« the most favorite nut is also the least expensive »).

**Trends in the price of the cashew kernels**

- An overall decrease of the cashew kernels price since late 80’s

The graph above (Figure 6) presents the average annual values of the price of the grade W320 between 1972 and 2006. The data in USD / lb have been obtained from various sources and then converted in CFA / kg using the exchange rate of the US dollar.

Since the late 80’s, these data show a clear decreasing trend, just reduced by two exceptional years, 1999 and 2000.

There is no indication that this trend could be reversed in a near future.
We also present weekly values of the W320 price FOB India between November 2004 and September 2006. The trend is also clearly on the decrease and there is no evident seasonal variation (Figure 7).

![Figure 7: weekly prices FOB India of the grade W320 (2004-2006)](image)

**Competition in the world cashew industry**

For some of the observers of the Indian cashew industry, this one is facing difficulties on the international marketing of its products and seems on the decline. For some of the recent editions of “Cashew Weeks” of Commodity India, the Vietnamese cashew industry is the main cause of some problems, namely:

- An oversupply of cashew kernels on the world market;
- An undercutting of the price of the cashew kernels.

Currently, in the world market, there should be oversupply of cashew kernels, mainly from Vietnam at prices at least 0.10 cents / lb less than that of the Indian price. Thus, oversupply by undercutting the price has negatively affected the Indian export.

In fact, Vietnam has become a major threat to the Indian cashew kernel in the world market. In less than 10 years, Vietnamese industry was able to export around 100,000 tons of cashew kernels. The raw nut production in Vietnam is estimated at over 600,000 tons and given this trend, Vietnam might attain the number one position as the world supplier of cashew kernels within some years.

Following these assumptions, the decreasing trend in the price of cashew kernels should be due to this oversupply and not by a decrease in the consumption. The offer of kernels is growing quicker than the demand and thus price are slowly reducing.
The demand for organically certified foods is very high and is growing steadily in most of the developed countries, especially in the USA, Europe and Japan.

Since the 90’s, world organic market has been growing with an average rate of 20% per annum. In future, this growth rate would be about 10 - 50 % in different countries.

To obtain organic certification is easier for cashew than for other agricultural products as the cashew trees are in most countries grown without any fertilizers or chemicals products.

The accreditation system includes certification of organic farms, products and processes and is concerning all the different stages of the cashew industry, from the field at the village level to the importers of the kernels in developed countries. Then, the traceability of the product needs to be accurately organized and followed.

All the different types of cashew processing units can have access to organic products and organic certification.

The price of the organically grown products can be 5 - 30% higher than for ordinary foods.

Another “niche” segment is the Fair Trade market which is mostly built for small scale processors at the village level. The Fair Trade Labeling Organization (FLO) has recently added cashew kernels on its list of possible “Fair Trade” Products

**ANALYSIS OF THE OPPORTUNITY**

**Massive and growing Ivorian production of raw cashew nuts**

In 1980, the company AFRECO exported the first 500 tons of raw cashew nuts from Côte d’Ivoire.

The annual exports of cashew nuts from Côte d’Ivoire have increased drastically during these last ten years, from 25,000 tons in 1996 to more than 200,000 tons in 2006.

The whole northern half of the country is involved in the cashew nuts production and the production area is expanding into the south.

Any traveler in the northern half of the country can observe the importance of the surface occupied by young and unproductive plantations. We may assume that the production of the country should reach 250,000 or 300,000 tons in a very near future. In this case, Côte d’Ivoire should reach the third rank among the cashew producing countries, just before Brazil.

**Facilities, knowledge and expertise are locally available**

The cashew nuts processing industry is about 30 years old in Côte d’Ivoire.
Some different units can be rehabilitated, some others have been recently established, some units were imported in 2006 and an EU funded project has installed small scale processing units.

- **Some existing facilities can be rehabilitated**

  . AICI ("Anacarde Industrie de Côte d’Ivoire")

This unit, established in Korhogo in 1975, has experienced long periods of inactivity and some periods of processing. This unit was recently managed by the group AFRECO under the name CAJOUCI and has processed a total of 6,500 tons of raw nuts for the period from 1998 to 2001.

  . SITA S.A. ("Société Ivoirienne de Traitement d’Anacarde")

SITA established in Odienné in 1998 is currently under operation but already needs some rehabilitation works.

- **Some processing units have been recently established**

One main processing unit and two secondary units, founded in 2004, are currently operated by OLAM, the Singapore based giant of the cashew industry.

- **Some units were imported in 2006**

Seven new units have been recently imported from India by the FENOPACI (see below):

  . 5 units for cashew nuts processing
  . 1 unit for cashew apple processing
  . 1 unit for CNSL (Cashew Nut Shell Liquid) processing

- **Small scale processing units**

Three small scale processing units were implemented near Bondoukou in 2004 by the NGOs INADES & RONGEAD. These units are going to export in October 2006 their first container of cashew kernels through the Fair Trade.

Ten more units shall be installed in five different regions of Northern Côte d’Ivoire from 2007.

All these activities in the cashew nuts processing have increased knowledge and expertise in the country (executives, staffs, equipment manufacturers)

**Potential impacts of the cashew industry for the country**

The value of the exports of 200,000 tons of raw cashew nuts is around 40 billions CFA and the amount of export taxes imposed by the State is around 3,5 billions CFA.

The transformation of 200,000 tons of raw cashew nuts should (Table 2):
. Produce more than 40,000 tons of cashew kernels;

. With a sales FOB value around 85 billions CFA (with the September 2006 prices for cashew kernels and USD exchange value).

. Create 50,000 – 60,000 direct and full time jobs with a total amount of wages about 15 billions CFA per annum.

. Required an overall investment of:
  
  CFA 15 – 20 billions for equipment (USD 30 -40 millions)
  CFA 20 – 28 billions for buildings (USD 40 – 50 millions)

. Create and sustain numerous activities and jobs in the environment of the cashew industry:
  Services to industry (sub contractors, construction, mechanics, trucking, security, banks, insurance, cartons, imports of materials, small equipment, utilities …)

  Generate demand for local services and supply to workers (clothes, schools, food, drinks, small shops, banks, construction, lodging …)

<table>
<thead>
<tr>
<th>Raw nuts production (tons)</th>
<th>200,000</th>
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<tr>
<td>Export price (CFA/kg)</td>
<td>200</td>
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<tr>
<td>Export value (millions CFA)</td>
<td>40,000</td>
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<td>Taxes (millions CFA)</td>
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<th>Processing industry</th>
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<tr>
<td>Average yield in kernels</td>
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<td>Cashew kernels production (tons)</td>
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<td>Price of W320 FOB India (USD/lb)</td>
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<tr>
<td>Exchange rate CFA/USD</td>
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<td>All kernels price / W320 price</td>
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<tr>
<td>Export price (CFA/kg)</td>
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<tr>
<td>Export value (millions CFA)</td>
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<tr>
<td>Full time jobs created</td>
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<td>Executives</td>
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<td>Supervisors</td>
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<td>Workers</td>
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<tr>
<td>Total wages / year (millions CFA)</td>
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<tr>
<td>with all bonus</td>
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<td>Required Investments</td>
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<td>Equipements (millions CFA)</td>
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<td>Buildings</td>
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<td>Working Capital</td>
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Nota bene: exchange rate CFA / USD 510

Table 2: the potential of the cashew nuts processing industry in Côte d'Ivoire

**Issues and constraints: why the cashew industry doesn’t exist in Côte d’Ivoire?**

- **Mismanagement of the former processing units**

  The following observations have been made about the former experiences in the cashew processing industry in Côte d’Ivoire:

  - **Workers badly paid or even never paid**: the wages of the workers were very low, especially for the women and some of them have been never paid after the closure of their unit.
  
  - **No incentives for workers**: the workers have never obtained any bonus or incentives for their work.
  
  - **Losses in the stock purchase or storage (quantities, quality)**: the units have been faced with their inefficiency to manage and control the purchase and the storage of their stock of raw nuts (in terms of quantity and quality).
  
  - **Lack of production knowledge and control**: the efficiencies of the process have been very low. The yields and the production costs have been poorly managed.
  
  - **Lack of knowledge of the requirements of the world market for cashew kernels**: the products of these units have been often very difficult to sale on the international market due to their inappropriate grading.
  
  - **Money embezzlements**: all units have been faced with money embezzlements from some of their executives.

- **Size of the former processing units**

  The formers units were planned to process about 1,500 – 2,000 tons of nuts per year. Such unit has usually a high level of fixed costs and then some difficulties to reach the profitability level.

  In addition, the smaller the size is, the more it is difficult to propose the ‘’mono grade’’ container that the importers usually look for. The importer is then in a position to impose reduced prices for the goods (this notion will be explained later in this report).

- **Access to credit and Financial costs**

  For the stock purchase (and other fund needed), the lack of an efficient national banking system requires to obtain the necessary funds with an international Bank. The consecutive high interest rates are generating financial costs which are an handicap for the profitability of the company.

- **High level of some production costs**
In Côte d’Ivoire, some of the packaging materials needs to be imported (plastic pouches for vacuum packaging). Some inputs which are manufactured locally are also very expensive (cartons, labels).

The processor must also support the high cost of the utilities (electricity and water).

- **High level of freight costs**

Compare to other producing countries, the low volume of the traffic between Côte d’Ivoire and USA or UE generates high costs for the freight. In addition, the monopolistic situation of the forwarding sector in the country reduces the competition and then the possibility to obtain better prices.

- **High competition for the purchase of the raw cashew nuts**

All the Ivorian processors are competing with the Indian buyers for their purchase of their raw nuts on the national market. There is no regulation of the cashew nuts exports and even no overall association of this sector.

There is also no possible agreement between producers of nuts and processors.

- **Lack of a national market for cashew kernels or for the by products**

The cashew kernel is not well known in the country, then the demand for this product is very low and the whole production has to be exported.

It is the same problem for the by products which have no local market.

- **Industries harassment by Government bodies**

All local industries are faced with the high level of the taxes on wages, taxes on land, taxes on the turnover, taxes on the profit …

There is also the customs harassment and consecutive costs for the imports of equipment or materials.

All trucking costs for raw cashew nuts and even for kernels are increased by the ordinary bribes which are claimed on the roads by the police.

- **Incentives for industry have never existed**

The Government of Côte d’Ivoire has never try and even think to help the local processing of cashew nuts. It has to be compared with all incentives and positive regulations which have been implemented from a long time in India and Brazil, for 10 years in Vietnam and which are now existing in smaller producing countries like Tanzania, Nigeria, Ghana, Benin etc.

Some of these issues can be compared with the situation existing in the main producing countries (India, Brazil, Vietnam, Table 3).
<table>
<thead>
<tr>
<th></th>
<th>Côte d’Ivoire</th>
<th>India</th>
<th>Brazil</th>
<th>Vietnam</th>
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<tr>
<td><strong>RAW NUTS MARKET</strong></td>
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<tr>
<td>National Market</td>
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<td>Exports regulation</td>
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<td>State intervention</td>
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<td>Agreement farmers - processors</td>
<td>0</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
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<tr>
<td>Supply of the factories</td>
<td>National market (January-May)</td>
<td>National market (April-August)</td>
<td>National market Understanding between producers and processors</td>
<td>National market State regulation Possible purchase in Africa</td>
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<tr>
<td></td>
<td>National market (Sept.-Dec)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KERNELS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing units</td>
<td>+</td>
<td>++++</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td></td>
<td>All size units</td>
<td></td>
<td>Large size units</td>
<td>All size units</td>
</tr>
<tr>
<td>Access to credit</td>
<td>0</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td>State intervention</td>
<td></td>
<td></td>
<td>State intervention</td>
</tr>
<tr>
<td>National consumption</td>
<td>0</td>
<td>++++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Market for by-products</td>
<td>0</td>
<td>++++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>CNSL</td>
<td>0</td>
<td>++++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Skins</td>
<td>+</td>
<td>++++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Kernel wastes</td>
<td>0</td>
<td>++++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Shells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: comparison between cashew processing industry of various countries

**IDENTIFICATION OF THE PARTICIPANTS**

**Cashew producers and organizations**

- Cashew Producers

The following estimates are available (ANADER, 2005):
  . 250,000 cashew producers
  . 420,000 hectares under cultivation
  . Yield of dried raw cashew nuts about 300 - 500 kg / ha
- Surface per producer about 1 - 3 hectares
- Plantation density about 150 – 500 trees / hectares

There are two other reliable sources of information about the cashew plantations and the farmers:
- the census made by the company AFRECO for its organic program
- the census of the cooperative COPABO for its Fair Trade project

The results of these census are:

- The average surface per producer is between 3 ha and 8 ha, from a minimum of 0.5 ha to a maximum of 75 ha.

- The yield of dried raw cashew nuts is 210 kg / ha around Nassian, 630 kg / ha around Dabakala and between 250 and 270 kg / ha for the three villages of the COPABO project. The higher yield of Dabakala is certainly due to the fact that cashew plantations are younger in this area.

→ the total surface under cultivation in Côte d’Ivoire is probably much higher than 420,000 hectares for a production of 200,000 tons (and average yields around or below 300 kg/ha).

Regarding the number of young plantation that one can see everywhere in the North of the country, the total surface planted with cashew trees is probably between 750,000 and 1 million hectares.

→ the number of cashew producers is probably less than 250,000 as the average surface per producer is not under 3 ha in our figures.

In India, the surface under cultivation should be around 770,000 ha with an average yield about 710 kg / ha (from 470 to 880 kg / ha depending on the Indian State). Then, the yields observed in Côte d’Ivoire should be in the inferior level of those observed in India.

In Brazil, 250,000 tons of raw nuts are produced on about 690,000 hectares mainly owned by small growers.

For cashew plantations with selected varieties, irrigation, fertilization and chemical treatments against pests, the yields could reach more than 2 tons of dried nuts per hectare (in Australia).

- **Cooperatives**

The NGOs INADES and RONGEAD organized in 2005 and 2006 some workshops for executives of cooperatives operating in the cashew sector.

These workshops have concerned about 70 cooperatives from 8 Regions of Northern Côte d’Ivoire. The objectives were to train cooperatives executives on the fields related to their activities in the cashew business, namely:

- The assessment of the quality of the raw nuts through the understanding and the mastery of the sampling of the raw nuts and the outturn calculation;

- The understanding of the links between the price of the raw nuts and the international market for cashew kernels;
The management of the cooperatives and the relationships between cooperatives;

. The relationships between cooperatives and Governmental bodies;

. The understanding of the new regulations of the cashew nuts market.

These workshops have confirmed that the cooperatives operating in the cashew sector have very few experience in that business. Most of the cooperatives which have attended these workshops have traded very few quantities of raw nuts. For the biggest, the volumes of raw nuts traded per year are about 2,000 tons.

In 2003, the cooperatives of the Bondoukou Region (the most important producing Region of Côte d’Ivoire) should have traded less than 10% of the total quantity of the cashew nuts produced in that area.

- Federations of cooperatives and producers organizations

There are several recent and opportunistic federations of producers. Most of them are not really active at the village level but more present in the numerous meetings occurring at Abidjan or Yamoussoukro.

The most active of these organizations is the FENOPACI (Fédération Nationale des Organisations Professionnelles Paysannes Agricoles Productrices d’Anacarde de Côte d’Ivoire).

In 2005, FENOPACI got a USD 1.5 millions credit from the Government of India to buy several processing units for cashew (see below).

FENOPACI also launched in September 2006 the “Bourse de l’Anacarde”, a private company aiming at the marketing for the cashew nuts. The objectives of this structure are:

. organize the collection and the marketing of the raw cashew nuts
. negotiate on behalf the producers the better price for their products and the sales conditions
. implement some logistic platforms for the collection of the products, the testing of the quality, the weighing of the quantities, the loading of the containers and their expedition after the completion of all transit documents.
. following the payments on behalf of the seller

The company is targeting the collection of about 50,000 tons of cashew nuts in 2007.

Local traders

The trading at the village level is mainly in the hands of the numerous traders which are buying the product on behalf of the Indian exporters. There is currently no decree related to the agreement of these traders so they are always in the position to trouble the raw cashew nut market in the country.

Potential processors and investors

- SITA

This company is in the SODIRO group which is owned by the Touré’s family.
Mr Touré is a special adviser at the Cabinet of the Minister of Agriculture (he is in charge of Cocoa and Coffee). He has been in the cashew sector for many years. He has also launched ADEFICA (see below).

Mrs Touré is the PDG of SITA. She is also vice-president of OTIFA (see below) and member of ACA (see below).

SITA S.A. owns a cashew nuts processing unit located at Odienne (far North West). This unit was launched in 1998. It is a unit based on the Indian technology, with large buildings and good equipment. Unfortunately, some of them are out of order.

Their 150 cutting machines should process 7.5 - 15 tons of raw nuts per day or 2,000 – 4,000 tons per year.

This unit has been facing with some difficulties since its establishment (lack of supply, mismanagement, staff problems etc.). An audit of the factory and a full proposal for its organization and management was done in February 2006.

SITA owns also a cashew plantation of 150 ha near Odienne. This plantation has more than 10 years and is well planted and maintained.

The others assets of the Touré’s family in Odienne are one hotel and a micro finance institution (CECO, “Coopérative d’Epargne et de Crédit d’Odienné”).

During this mission, SITA has proposed a CFA 2 billions project in the Odienné Region. This project is mainly dedicated to the organization and the framing of the producers but proposes also the implementation of 20 small scale processing units. These units should supply SITA unit with kernels.

- AICI

This is a cashew processing unit established by the State through SOVANORD in 1976. This unit is based on the Italian technology (OLTREMARE) and has a processing capacity of 1,500 tons per year.

The nuts are cooked 2 minutes in a CNSL bath at 200°C then shelled in 19 semi-automatic shelling machines (320 kg / day in two shifts). Separation of kernels from the shells is done automatically. After that, the kernels are dried and all remaining process can be done by hand (there are equipment for peeling, sorting and grading but they are not really efficient).

Between 1998 and 2002, the Group AFRECO (former leader in the cashew nuts exports) has managed this unit. To increased its capacity and reduce the unit costs, some equipment were imported from India in 2000 (25 cutting machines, one steamer and 2 cookers).

The activity was stopped in first half of 2002 because of the price of the raw nuts on the local market and AFRECO took back its Indian equipment.

It was not possible to meet the owner of the factory during this mission. In fact, FENOPACI has asserted they have the authorization to use this facility.
- **FENOPACI**

The units imported are already available in the Port of Abidjan. They are composed of:

- 5 units for cashew nuts processing
- 1 unit for CNSL processing
- 1 unit for cashew apple processing

Bill of lading and packing lists were examined before this mission. Each cashew nuts processing unit should have 40 cashew cutting machines and all the appropriate equipment (sorter, steamer, cooker, drier, materials for peeling and grading, vacuum packing machine, other equipment).

These units are supposed to be installed in the following sites:

- 1 cashew nut processing unit at Bouna (far North East)
- 1 cashew nut processing unit at Bondoukou (far North East)
- 1 cashew nut processing unit at Odienne (far North West)
- 1 cashew nut processing unit at Seguela (Center West)
- 1 cashew nut processing unit at Korhogo (far North)
- 1 CNSL processing unit at Korhogo
- 1 cashew apple processing unit at Korhogo

Some existing buildings should be rehabilitated and used to install these units (Bouna, Korhogo). Some new buildings should be erected.

- **OLAM IVOIRE**

OLAM IVOIRE is a subsidiary of OLAM International Ltd, leader in the cashew nuts marketing and processing throughout the world (25% of the cashew market, factories in 7 countries). In Africa, OLAM is managing processing units in Mozambique, Tanzania and Nigeria. OLAM has launched a factory in Côte d’Ivoire in 2004 and is planning to start similar activities in Ghana.

The OLAM IVOIRE facility in Dimbokro is organized around 250 cutting machines. 150 other cutting machines are installed in Mbatto where cooking and cutting are done by an associated cooperative (of the cocoa-coffee sector). Then the de-shelled kernels are sent to Dimbokro for further processing. In Toumodi, OLAM has initiated peeling activity with a cooperative of women. The kernels with skins are sent from Dimbokro and sent back after peeling.

All 400 cutting machines have a processing potential of about 16 - 32 tons per day (4,400 - 8,800 tons per year). For the moment, the quantity shelled per machine is around 20 kg for the women and less than 10 kg for the 100 men which are working at the Dimbokro facility.

The OLAM’s projects in the cashew sector in Côte d’Ivoire are:

- Install 150 cutting machines in the prison of Dimbokro;
- Establish special facilities to give jobs to disabled person;
. Reach an overall processing capacity of 15,000 - 20,000 tons of nuts per year with their existing facilities and with the new factories they are planning to establish in Korhogo and (or) Bouaké.

The main problems encountered by OLAM in their processing activities are:

- Lack of available space and buildings in Dimbokro
  (three different sites, one for the sorting and the storage of the nuts, one for cooking and shelling, one for all other process components);

- Lack of available space & buildings in Toumodi
  (two different sites for the 250 women doing peeling);

- These numerous sites lead to additional transport costs
  (around 15 CFA / kg of nuts)

- Lack of continuity in the availability of their staff. The numerous changes of people is leading to a poor efficiency of the work and then the objectives of the production and the appropriate productivity are difficult to be reached.

- High level of wages costs due to the low efficiency but also to the organization which was implemented. For instance, the low level of the objectives which were assigned to the cutting section. In addition, all workers are controlled and paid by a service provider, RMO, which may cause additional costs).

Some other difficulties are due to the Ivorian context and are affecting the compared competitiveness with other producing countries. OLAM is evoking the following subjects:

- The high level of the construction costs for new buildings
- The production costs
- The workers efficiency
- The lack of national market for lower kernels grades and by-products
- The low international recognition of the Ivorian origin (leading to lower price for kernels)
- The high financial costs for the 10 month running stock of raw nuts
- The lack of State Incentives in favor of the cashew industry sector

This later point has been developed by OLAM through a Memorandum which is presented below.

It seems that OLAM has already given an ultimatum to the local and national authorities: OLAM will close its processing units if there are no incentives implemented by the Government before March 1st 2007. On the contrary, if the appropriate measures are taken, they will open very fast their new units (they need about 6 – 8 months to start a new factory from the time the decision has been taken).

- Other potential partners

Some private investors are interested in taking position in the Ivorian cashew sector but are reluctant to do something without a clearer visibility of the organization of the industry. Some problems which recently occurred between some officials bodies are not very encouraging (conflict between the Ministry of Agriculture, ARECA and OTIFA).
The AICI facility in Korhogo could be used by some investor in case of a withdrawal of FENOPACI or in a joint venture with that federation.

An additional processing unit should have been installed in Bongouanou. This information coming from FENOPACI has not been verified. The equipment should be an old Brazilian unit imported many years ago and never installed.

**Government agencies**

- **Ministry of Agriculture**

This Ministry is technically in charge of the cashew sector and is the regulatory authority of all the other following organizations.

From many years, the exports of the cashew nuts have been put under the system of the DUS (Droit Unique de Sortie). The DUS is a levy collected for the Public Revenue with a value of CFA 10 / kg of nuts exported.

The emergence of ARECA and the first attempts to organize the cashew sector in Côte d’Ivoire has introduced some other levies on the export of raw cashew nuts. All levies collection on these exports and the beneficiary organizations are (in CFA / kg of nuts):

<table>
<thead>
<tr>
<th>Levy</th>
<th>Amount (CFA / kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUS</td>
<td>10</td>
</tr>
<tr>
<td>ARECA</td>
<td>2</td>
</tr>
<tr>
<td>OTIFA</td>
<td>2</td>
</tr>
<tr>
<td>FIRCA</td>
<td>2</td>
</tr>
<tr>
<td>ACE</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

- **ARECA** (« Autorité de Régulation du Coton et de l’Anacarde »).

Established in September 2002, ARECA is in charge of the organization of the cotton and cashew sectors. ARECA is partially funded by a CFA 2 levy per kg of exported raw nuts.

ARECA has elaborated some officials texts related to the organization of the cashew sector. The main regulations are related to the following subjects:

- organizational framework of the cashew sector
- ARECA’s responsibilities
- OTIFA creation, activity and responsibilities
- Nature and amount of the levies on the exports of raw nuts (fixed on a annual basis)
- Raw nuts market and export regulations
- Regulations for the exporters approval

ARECA is trying to create the regulatory body for the “Interprofession” which is supposed to group in an unique committee all stakeholders of the sector, the producers, the exporters and the processors. A special meeting is supposed to be held on November 15th for the implementation of this association (in replacement of the existing OTIFA).

ARECA organized in August 2006 a workshop on the cashew sector “Bilan diagnostic et Perspectives de la filière anacarde”. The general report of this workshop is available.
recommendations, the main points regarding the development of the processing industry in Côte d’Ivoire are:

. A more pronounced political willingness in favor of the development of the processing industry with an objective of 20% of the production of raw nuts processed in 2010.

. This willingness must be illustrated through:
  (i) fiscal incentives;
  (ii) support of actions to find outlets for cashew by-products;
  (iii) the creation of a special fund supplied by taxes on the export of the raw nuts;
  (iv) the total or partial exemption of export taxes for processors;
  (v) the tax exemption on all equipment and inputs for processing units;
  (vi) the total tax exemption for the first years of activity.

ARECA has recently developed some projects:

. A support project for the development of the cashew sector in Côte d’Ivoire. The terms of reference have been produced and an invitation for tender should be spread.

. A program for the training of the cooperatives of the cashew sector has been established in cooperation with the FAO. It is a CFA 2.4 billions project which is addressing to all farmers and cooperatives.

These projects are very ambitious but some of the questions arisen should be discussed. For instance, it is said that there is no appropriate equipment for the small to medium processing units and that, consequently, there is a need of some research actions on that subject. We think this basic premise is wrong and that all technology already exists inside or outside Côte d’Ivoire.

The ARECA/FAO program, in its National phase is concerning 950,000 people. This figure is surprising as it is also stated that there are 250,000 cashew producers in the whole Côte d’Ivoire. The remaining 750,000 others should be all other farmers regardless of their type of production. This program shows also some huge lack of knowledge of the cashew production and cashew processing.

In fact, this program seems to be very similar to the already funded and running program develop by INADES/RONGEAD (see below).

- **OTIFA** (« Organe Transitoire de l’Interprofession de la filière Anacarde »).

OTIFA was supposed to prepare the establishment of an interprofessionnal organization by the end of 2006.

OTIFA is funded by a CFA 2 tax per kg of exported raw nuts.

The relationship between ARECA and OTIFA are very difficult and some money problems have been exposed in the newspapers. OTIFA seems to have the support of the Ministry of Agriculture
and both have tried to stop the workshop organized by ARECA which has, on the contrary, received a strong support from the Prime Minister!

- **FIRCA** (« Fonds Interprofessionnel pour la Recherche et le Conseil Agricoles »).

The FIRCA is in charge of funding research programs on agronomy and forestry and of the support to professional agricultural organizations.

The World Bank has funded the feasibility study of the implementation of the FIRCA.

The FIRCA was established in 2002 and received funds from all agricultural sectors. For the cashew sector, FIRCA is supposed to receive CFA 2 / kg of exported raw nuts. In fact, these funds were not collected in 2006 because the decree was not signed. Now it is and FIRCA will have these funds in 2007.

In the « Programme de développement des filières 2005-2006 » developed by the FIRCA, there is 9 different programs which are related to the cashew sector. The total cost of these projects should be around CFA 1.4 billions. FIRCA will have to find additional funds to set up these programs but they assure they are going to start them as soon as they will have gotten the money from ARECA.

Terms of reference for all programs are already available and they will send invitation to tender to a selected list of consultants or firms.

- **ANADER** (« Agence Nationale pour le Développement Rural »).

This agency is theoretically in charge of the framing, training and support of the farmers. Very few positive actions have been undertaken in the cashew sector.

**Service Provider**

- **ACE**

This company was in charge of the quantity and the quality control of the exports of raw cashew nuts during the 2006 campaign. Its service is paid with a levy of CFA 1.5 / kg of nuts exported. The Ministry of Agriculture has appointed ACE without any consultation with other stakeholders of the sector, especially ARECA.

A new decree recently taken by the Minister of Agriculture (and the Ministries of Commerce and for Industry) extends the contract with ACE for 3 years more. This decree has been established in emergency because the work of ACE has been seriously criticized during the ARECA’s workshop held in August 2006.

In fact, all the quality and quantity controls done by ACE are executed at the Abidjan harbor when all the negotiations between sellers and buyers have been already completed. So, the use of these controls is very weak for both parties.
**Research agencies**

- **CNRA**: «Centre National de la Recherche Agronomique».

The CNRA has a private status in which the State has 40% of shares, the other 60% being detained by private organization of the agricultural or agro industrial sectors.

Some research on cashew varieties have been undertaken in their research station of Lataha (near Korhogo).

CNRA is supposed to be in charge of some research programs launched by the FIRCA.

**Non governmental organization**

- **RONGEAD & INADESCôte d'Ivoire**

Since the early 90’s, RONGEAD (a French NGO based in Lyon) and its local partner INADES Formation (affiliated to INADES International) are supporting the cashew sector in Côte d’Ivoire through different kinds of actions.

There are two basic components in the actions of the current project. The first one is addressing to the cooperatives with the aim of improving the professionalism of their actions. The second component is the support of the development of the small scale processing of cashew nuts in Côte d’Ivoire.

Regarding the actions in favor of the cooperatives, several training workshops have been organized throughout Côte d’Ivoire for cooperatives executives (see above). During these workshops different types of training manuals and training materials have been supplied to the cooperatives. These items are:

- **Manuals**
  - «Cashew tree» (technical handbook on plantation, harvest etc)
  - «Creation of a new cashew trees plantation» (Cartoon handbook)
  - «Rehabilitation of a former cashew trees plantation» (Cartoon handbook)

- **Materials**
  - Poster on raw nuts defects
  - Raw nuts defects charts
  - Cashew cutters for testing
  - Scales and knives

The small scale processing objective is implemented through pilot projects. During the first stage of the program which is ending in December 2006, three processing units have been implemented in villages near Bondoukou. The units are managed by women association and are supported by a local cooperative (COPABO). Each of these units has the following equipment and buildings:

- one building (about CFA one million, paid by the village)
- one steam cooker for the raw nuts (paid by the village, CFA 25,000)
. ten cutting machines of two different types, all manufactured in Côte d’Ivoire (CFA 100,000 – 150,000; paid by the project)
. one drier for kernels, manufactured in Côte d’Ivoire (CFA 1 million; paid by the project)
. materials for peeling and grading (CFA 0.5 million; paid by the cooperative)

The women had firstly sold their roasted kernels through COPABO on the local market at prices of CFA 5,000 / kg and 4,000 / kg respectively for the whole kernels and for the pieces.

Then, the COPABO (and all stages from the farm level to the processing of the nuts) have been certified by FLO (Fair Trade Labeling Organization) and a French company has placed an order for one container of kernels (12 - 15 tons). The products are currently under processing in the village.

In order to use the required packaging for such goods, a vacuum packing machine and plastic pouches have been imported from Italy (everything paid by the project). A packaging unit has been installed in Bondoukou and is receiving every two days the kernels which are produced in the villages. The kernels are packed in 7 kg pouches and three bags are placed in one carton. The cartons are manufactured in Côte d’Ivoire. The container will probably be shipped in November.

The whole project has been funded by the European Commission with a total cost about Euros 1 million, 75% funded by EC.

A second project has been accepted by the EC (with about the same cost) and must start in the first half of 2007. In this second project, the support of the small scale processing will be extend to other producing regions of Northern Côte d’Ivoire, namely the Denguélé, Savanes, Vallée du Bandama, Worodougou) and 10 units would be implemented near different towns (Odienné, Madinani, Korhogo, Boundiali, Dabakala, Katiola, Mankono, Séguéla, Bouna, Tanda).

- **STCP ("Sustainable Tree Crops Program")**

STCP is funded by the World Cocoa Foundation and USAID and managed by the International Institute of Tropical Agriculture (IITA) based in Nigeria. Their current program is based on a public - private partnership and is focusing on cocoa farmers and cooperatives in Côte d’Ivoire, Ghana, Nigeria and Cameroon. They have also a program for cashew farmers in Guinea.

They are planning to extend their activity on the cashew sector of Côte d’Ivoire and their local representative made a presentation at the PNDDR some weeks ago. They are currently elaborating their program and looking for potential partners. African Cashew Alliance, TECHNOSERVE and the West Africa Trade Hub of USAID in Ghana should be involved in this program.

Their “Farmer Field Schools” learning approach involves trainers which it will be necessary to train on cashew cultivation and practices. Their objectives are very similar to these of RONGEAD and INADES.

**International organizations**

The European Commission is funding the RONGEAD/INADES project.

The FAO is involved in the ARECA project presented above.
The GTZ (German Technical Cooperation), mainly involved in the vocational training, should developed partnership with SITA.

**Regional or Sub Regional organizations**

- **ADEFICA** («Association pour le développement de la filière cajou africaine ») and **ACA** (« African Cashew Alliance »)

These two organizations are pursuing the same objectives and it seems that the ACA is now the main regional body regarding the development of the African cashew sector.

The ACA was launched in early 2006 with the support of the USAID. ACA objectives are to define better policies to support the sector, drew up action plans to enhance cashew production, processing, marketing and trade.

ACA involves public and private companies, government agencies, NGOs and national cashew producers or processors organizations. All stakeholders involved in the ACA have signed a “Memorandum of understanding concerning an alliance to promote the development of the African cashew sector”.

The statement said the ACA would work closely with private sector producers, processors and exporters, as well as relevant government agencies, donors and NGOs already providing support to the sector to drive the development and growth of a competitive cashew industry in Africa.

The statement said also the ACA would merge the interests, expertise and resources of cashew industry stakeholders towards increasing farmer incomes, creating jobs in the domestic industry and raising export earnings.

The USAID has provided a secretariat based in Ghana to manage ACA operations.

**ENABLING ENVIRONMENT**

**Physical infrastructures**

- **Road and utilities**

The manpower required for starting an industry supposes that the processing unit must be installed in a medium to large town where all utilities and services are generally available throughout Côte d’Ivoire.

The road network is well developed. Maintenance issues are important but not a major constraint for developing an industry.

Electricity is supplied everywhere except in some rural areas.
Water supply could be of importance and may require specific investments in some cities.

- **Constructions**

Construction costs have been identified as a major constraint by OLAM. There is also a low availability of construction companies or qualified contractors in some areas.

*Financial infrastructures*

The low level of support of the industry by the local banking system is a general constraint of the Ivorian industry. It is particularly obvious for an industry as cashew processing which needs large amount of money just to buy the raw material.

*Legal/political environment*

The Ivorian political issues are very well known and don’t need further explanations.

The legal environment of cashew sector is under implementation by ARECA and, for the moment, there is no special regulation regarding the cashew industry.

*Business environment*

Corruption and harassment are general concerns for all private companies in Côte d’Ivoire.

There is a high pressure from Governmental bodies in charge of collecting all kind of taxes. Work inspection services are also harassing companies after lay off or when some work conflict appears.

Harassment and corruption affect also all trucking activities and increase the trucking costs and time.

Regulatory bodies are not particularly active in supporting the business and the industries at every level.

**ENSURING EXECUTION**

*Management and technical skills - Financial management*

The young executives who were previously available from the Ivorian high schools were with a good level. The situation seems to have drastically changed as these high schools are now mismanaged. The political environment and the politicization of the students have not created the appropriate environment for education.

Nevertheless, there are already some executives with experiences and knowledge in the cashew industry. Most of them were employed by CAJOUCI or have experienced training periods in this unit.
Some of good technicians also exist and there is a reservoir of women and men who already know all different aspects of the processing of cashew (experiences acquired in the processing units which have existed or which exist, namely AICI-CAJOUCI, SITA, OLAM and the small scale units).

In September, FENOPACI sent 10 persons in India for a one month period of training.

The overall management and the financial management must probably be a more relevant constraint for a potential investor.

Some of the biggest companies which are operating in Côte d’Ivoire are now using to recruit Ivorian executives coming from foreign high schools or universities.

**Appropriate technology and “Best practice” processes.**

The appropriate technology for cashew processing already exists in Côte d’Ivoire. Most of adapted equipment have been imported from India. Most of these machines can now be produced in Côte d’Ivoire by manufacturers who have understood all problems the cashew industry is facing (yields and quality).

The issues regarding the quality and the traceability of the cashew kernels have been emphasized in the different units or during some working groups.

The quality of the kernels exported from Côte d’Ivoire has been recognized and appreciated in various importing countries (USA, Europe and South Africa).

**REPLICATE/SEARCH FOR IMPROVEMENT**

**Improved techniques and Innovation**

The techniques and the technology used in the cashew industry are quite basic.

The main problems of this industry could be the management of the production in terms of yield and quality, the organization and the payment of the staff and the control of the unit costs. It is mainly in these areas that innovation and improvements can be done.

**Growth opportunities and capacity to scale up**

The size of the Ivorian production of cashew nuts has already been emphasized and there is a massive potential for the cashew industry.
DEVELOPMENT PROGRAM FOR THE CASHEW PROCESSING INDUSTRY
IN CÔTE D’IVOIRE
DEVELOPMENT PROGRAM FOR THE CASHEW PROCESSING INDUSTRY IN CÔTE D’IVOIRE

SCENARIOS FOR CASHEW TRANSFORMATION IN CÔTE D’IVOIRE

Different options can be envisaged for processing cashew\(^1\), the extreme sizes of the processing units can be the following:

- A small scale processing unit for 150 tons of nuts per year
- A large size processing unit for 5,000 tons of nuts per year

Small scale units processing 150 tons of nuts per year

The small scale processing units are very popular among some of the stakeholders in the sector of NGOs and funding agencies. These units are typically implemented at the village level as it is in three villages near Bondoukou. These units can be of different sizes, some cutting machines for processing capacities between 10 to 300 tons per year.

In most of the cases, the kernels produced can not be sold on the international market and they are roasted, salted and packing to be sold on the local market. In Côte d’Ivoire, the INADES / RONGEAD project has experienced the difficulties to create demand for such product as cashew kernel is not well known in the country. In addition, the supply of the wholesalers must be well managed. The quality and shelf life are of great importance but often neglected.

The export of kernels produced in a village implies the need to obtain a sufficient quantity which can be shipped at a reasonable price. It implies also the need for the appropriate packaging. In the case of the above project, a packaging unit has been installed in Bondoukou to pack the kernels produced by the three villages. Such organization supposed the frequent collecting of the kernels and the control of the high hygienic hazards.

\(^1\) Some various technologies are used to obtain kernels from the cashew nuts. The most efficient and popular are based on the basic Indian technique and all its different versions. The Europeans OLTREMARE have developed a semi-automatic process which was mainly installed in Eastern and Western Africa. The AICI facility in Korhogo contains equipment of that type. Benefits and drawbacks of the OLTREMARE and the Indian systems are summarized in the Annex 1. There is a clear advantage for African country to use the India way of processing cashew. This technology is already available and well known in Côte d’Ivoire and most of the equipment can be manufactured locally (although it is sometimes cheaper in India for equipment of better quality). We have not taken into account the Brazilian system as we have few information about it.
- **Main advantages of a small processing unit**

  . **Basic technology**: the equipment and materials are very easy to install, use and maintain.
  
  . **Free from utilities**: this type of unit can be run without electricity and running water.
  
  . **Fixed costs reduced to almost zero**: such unit is not concerned by the usual fixed costs of a large size factory.
  
  . **Easily replicable**: all the equipment of this kind of unit can be found and manufactured locally at reasonable costs. The expertise to install and organized the unit are available in the country.

- **Main constraints of a small unit installed in a village**

  . **Hygienic issues**: all hygienic hazards are more difficult to manage at a village level than in a larger size unit. Some problems are often neglected like animals straying, water supply, storage of kernels etc.
  
  . **Availability of the workers at a day to day basis**: a lot of other occupations, especially the field works, decrease the availability of the workers and increase the time of getting well trained and efficient people.
  
  . **Very low quantities of kernels produced**: the kernel production can be of some kg per day. Nevertheless, a great care must be apply to these low quantities.
  
  . **Possible high production costs**: we can have a poor efficiency of the workers for almost the same salary than in an industrial unit. In this case, the unit production costs can be very high.

A small scale processing unit with an average capacity of 150 tons / year has been simulated for this report (Annex 2).

  . The total investment for the equipment is about CFA 8 millions.
  
  . Ten cutting machines are processing 500 kg of raw nuts per day and produce about 100 kg of kernels.
  
  . The jobs created should be around 50. In fact, the people involved in such unit are about twofold the necessary staff number (the frequent absences of the workers need to work with a large reservoir of people).
  
  . The production costs are about CFA 160 – 190 CFA / kg of nuts without the depreciation costs which are about 30 CFA / kg.
  
  . The kernels produced can be roasted, salted and packed for local consumption. They could also be sent to a central unit for being packing for export.
**Large size unit handling 5,000 tons of raw nuts per year**

A large size unit is attractive thanks to its scale, that permits it to absorb efficiently its fixed costs. This is particularly true in the case of a cashew nut processing factory. A large size unit will compete on the international market to sell its output. This requires control of quantity and quality, with consequent costs. This implies also the need to produce and export the goods which are in demand on the market. Cashew importers are mainly industrial traders which are looking for “mono – grade” container. It is obvious that it is always more difficult and expensive to handle, stock and manage the consumption of a container in which you can have up to ten or fifteen different grades of kernels, as it is for smaller scale factories. In this case, the importers can claim for a discount on the price of the goods.

In the case of a 1,500 tons factory, you are processing around 6 tons of nuts per day and producing around 1.2 tons of kernels. Among these kernels, you can expect 50% of the grade W320. So you will need around 25 days or one month of work to export a full container of W320. The problem is harder for the other grades which are produced in lower quantities. The pieces which are produced in small quantities are very difficult to sale in the international market and are often discounted.

Fixed costs and “mono – grade” container are pleading for the implementation of the largest size unit you can afford in your specific context. Constraints which are limiting the size of the project are mainly the supply of workers available in the chosen city, the necessary surface for the erection of the unit and the size of the financial effort for equipment, building, stock and working capital.

A 5,000 tons processing unit should be of interest in the particular case of Côte d’Ivoire. The rare units which have been exploited in Côte d’Ivoire have processed between 500 tons and 2,500 tons per year. The constraints of such units have been clearly identified. Several small size factories, for instance of 1,000 tons per year, could be implemented only if there are going to market their kernels in common (in order to “weight” on the market).

A full set of tables are summarizing the running of a 5,000 tons processing unit (Annex 3):

- Organization and equipment
- Investment for equipment and building
- Initial amount of money to cover the purchase of the raw nuts
- Working capital for 3 months
- Staffs, wages and bonus
- Simulation of the profitability (running account)

**Association large size unit – small scale units**

The constraints of both types of unit may be tackled via the association between one large size unit and several small units.

In this case, the small units produce kernels and send them to the big unit after shelling or peeling. The kernels received at the large size unit are then controlled, graded and packed in the same conditions than the kernels fully produced in that unit.

If well implemented, this may permit

(i) To unlock the marketing problems of the small scale processing units.
(ii) To increase the production capacity of the large size unit and then increase its profitability
There are various ways to implement such an association. The easiest one should be the purchase of the kernels produced by the small units at an agreed price depending on the quality of the product. Another one could be the payment of the work done by the small unit. The property of the raw nuts could determine the kind of agreement established between both parties.

The small units can be implemented by a cooperative (or several cooperatives), by the farmers themselves (or villages) with the support of the main unit investor.

The implementation of the large size unit and the start of its processing operation should precede the launch of the small size units.

**Impact of the cashew transformation for Côte d’Ivoire**

The potential of the cashew nuts processing industry for Côte d’Ivoire has been already exposed above (Table 2).

The processing in Côte d’Ivoire of the whole production of raw cashew nuts (as it is in India, Vietnam and Brazil) should be a massive opportunity in terms of jobs creation and of revenue generation for the country.

- **Jobs creation**

  The creation of 55,000 jobs is estimated through the assessment of the exploitation of a 5,000 tons processing unit. In this case, the ratio jobs / quantity of nuts processed per year (0.275) is lower than in the case of a small scale processing unit (0.34).

  Among these jobs, about 1,000 are jobs for executives, 4,000 jobs for supervisors and the remaining 50,000, or some 90%, are unskilled jobs.

  In the case of a study regarding the reinsertion of “ex-combatants”, a particular concern is the percentage of men which can be involved in the industry. The cashew processing units are usually proposing unskilled jobs for women as the work requires repetitive operations, patience and concentration. The high density of workers in the same space may be also a problem for unskilled young males.

  The percentage of males usually working in the cashew processing industry is between 5% and 10%, most of them occupying skilled jobs (executives and supervisors). However, in Guinea-Bissau and Mozambique this figure can reach 40%. Similarly, in its unit of Dimbokro, OLAM is employing 100 males in the shelling operation (40% of the total workers in this stage of the process) and in the small scale unit around Bondoukou, there are some males who are working in the shelling and peeling operation.

  We can assume that the percentage of males can be rise to between 20% to 30% in the short term, and 40% in the medium term, with an appropriate set of measures:
  - Education and training for a better understanding of cashew processing (Training funded by processors and NGOs)
  - Appropriate incentives to compensate the initial lack of efficiency of males (wages guaranteed within a three months training period)
  - Implementation of work-group for men with an adapted framing (supervisors trained...
among ex-combatants)

- **Revenue creation**

The export value of 40,000 tons of kernels is today of CFA 85 billions (USD 167 millions). The value added for Côte d’Ivoire would be more than twofold the CFA 40 billions value of the export of 200,000 tons of raw nuts.

Total amount of wages and bonus should be around CFA 16 billions.

The indirect impact on the economy could be enormous, with population and consumption increasing in all the concerned areas.

- **Required Investments**

The investment for equipment is around CFA 17 billions with a depreciation period of 3 to 10 years (depending on the kind of equipment).

Quotation for buildings is difficult to assess in Côte d’Ivoire. All construction materials have experienced large increase in their price (between 50% and 100%). This is mainly due to the international price of energy (which affects cement price), iron, steel and others metals.

The costs of building the required shelters for factories is between 50,000 and 100,000 CFA / square meter. Then, the investment for building is estimated around CFA 24 billions. It could be markedly reduced if the numerous existing facilities were used for cashew processing. There are a lot of unused buildings available in various cities in the northern part of Côte d’Ivoire. These buildings can be bought or rent and easily rehabilitated to be used for cashew processing. It should be the responsibility of the cashew processors to find such facility, with the support of the local institutions.

- **Working capital**

The working capital has been estimated for a three months period of activity. A 5,000 tons processing unit should have the need of a working capital about CFA 240 millions.

Such factory is supposed to produce around one container of kernels every 4 days or 6 containers per month. After a start period of 2 weeks, the monthly turn over could be around 190 millions.

Cashew containers are usually paid through letter of credit and against documents. Some importers can pay one half of the invoice at the receipt of the documents and one half between 30 and 60 days after this receipt.

**The use of other cashew products or by-products**

All successful cashew processing industries around the world have found solutions to obtain additional profit with the cashew apple, CNSL, kernels skins and kernels wastes.

- **Cashew apple**

Cashew apple can be processed and consume locally through a various panel of finished products.
Nevertheless, the massive Ivorian production could not afford the time to experiment and develop different kind of products such as jam, jelly, wine or even more sophisticated products. We assume that it could be quicker and more efficient to develop an alcohol production which can be used in various industries throughout Côte d’Ivoire (alcoholic drink industry and pharmacy suppliers are importing ethanol from developed countries) or in producing energy (for instance following the Brazilian way of using ethanol for motorized vehicles).

We are making in this report a proposal to clarify this opportunity

- **Cashew Nut Shell Liquid (CNSL)**

There is an international market for the Cashew Nut Shell Liquid. India is producing about 30,000 tons of CNSL an its total potential could be of 140,000 tons if all processors were using steam for cooking cashew nuts. India is exporting 30% of its CNSL production and is consuming 70% locally. The average price of raw CNSL is about 0.25 USD/kg.

CNSL is used in its raw form or as cardanol or recidol. CNSL is a low cost source of phenol and there are more than 200 patents for its industrial application. A new commercial use of CNSL could exist in the possible role of the anacardic acid in the nanotechnology (in preparing the magnetic “nanofluid”).

In Indian units, the CNSL is usually obtained from the shells (with a press) and then heated (to remove water) and stocked before further process into CNSL based polymers.

In Côte d’Ivoire, CAJOUICI exported 3 containers of that product in 2000 at an FOB price of USD 300 per ton (CFA 200 / kg). The CNSL was not refined. It was just raw CNSL coming from the squeezing of cashew nut shells with a press.

The 10 - 20% of CNSL contained in a raw cashew nut have a potential of 500 - 1,000 tons for a 5,000 cashew nuts processing unit. The linked additional turn over should produce some profit if the product is of good quality.

FENOPACI has imported a unit to process the CNSL following that way. We are making in this report a proposal to help the implementation of this unit and the commercialization of the product.

- **Kernels skins (testa)**

Cashew kernel skin contains about 40% tannin and there is market for that product in the tannin industry.

- **Cashew kernels wastes**

All kernels wastes obtain from the shelling, peeling and grading of the kernels could be sold as animal feed. The price of these wastes should probably be low but it is an immediate profit for the factory.

*Opportunities for organic production of cashew kernels*

This segment has already been experienced in Côte d’Ivoire. From 1995 to 2002, the group
AFRECO has organized producers of two different regions around Nassian and Dabakala. These producers have been engaged in the organic production of cashew nuts and then have gained the ECOCERT certification. From 1998 to 2001, half of the nuts processed by CAJOUCCI were organic certified nuts and the kernels have been sold in Europe and in the USA with a price bonus of about 10-20%.

The AFRECO program had involved 26 villages, about 600 farmers with 4,000 hectares.

In fact, the Ivorian production of cashew nuts is almost entirely organically grown as cashew producers never use chemicals fertilizers or pesticides. So, the organic certification is just a question of organization of the producers and production of all the required information (producers, cashew trees plantation, production of the nuts, traceability).

It will be an economic advantage for any investors to reactivate the network of these former organic farmers or to create any new network. The creation of any large size cashew trees plantation should also be made under an organic certification.

**PARTNERS AND OPPORTUNITIES FOR THE CASHEW INDUSTRY IN CÔTE D’IVOIRE**

The partners and the existing assets identified in this study are:
- SITA S.A. and their processing unit at Odienne
- FENOPACI and their 7 units recently imported from India
- OLAM and their running units
- The existing factory of Korhogo

*The projects of SITA*

We have examined the project proposed by SITA and answered with a full set of questions and remarks (Annex 4).

It seems inappropriate to follow SITA in its project aiming to organize and frame the cashew farmers. It is not in their specialty to implement such action and there are too many remaining questions about this part of their project.

We have suggested that the best project that SITA could propose should be the following one:
- Rehabilitation of their existing factory.
- Propose a valid business plan for 2007 with an objective of processing between 2,000 and 3,000 tons of raw nuts.
- Install 10 to 20 small scale processing units in villages of the Odienne region with an overall capacity of 1,500 to 3,000 tons (150 tons per unit).
- Collect and pack at the SITA main unit the kernels produced in these small units.

In this prospect, the export capacity of SITA should be between 3,500 and 6,000 tons. The jobs created should be more than 600 at the SITA main unit and between 500 and 1,000 for all small units.

Unfortunately, after two more meetings with the Managing Director of SITA, we are still waiting for a valid business plan.
The project of FENOPACI

For FENOPACI, we are in the same situation than for SITA. We have sent a letter (Annex 4) and we are still waiting a valid business plan for the implementation and the running of their 7 units.

The project of OLAM

For OLAM, we are not waiting any business plan as we assume they can handle it very easily. They have already announced their objectives of processing 15,000 to 20,000 tons with 3 or 4 large size units. This should imply up to 5,500 jobs with the creation of thousands of jobs in Korhogo and(or) in Bouaké.

We must also recall here the threat made by OLAM to close their processing activity in Côte d’Ivoire if there is no strong incentives in favour of the processing industry. In this case, they may establish processing facilities in neighbouring Ghana (to process some of the Ivorian nuts), or expand their current operations in Nigeria.

The rehabilitation and running of the processing unit in Korhogo

Regarding the cost of the erection of building in Côte d’Ivoire, it should be profitable to use existing assets to develop a processing industry.

We have also assumed it should be useful to valorise our own experience about the processing unit located in Korhogo.

Then, we have worked on a project which should associate the equipment of the existing unit and the implementation in the same compound of one of the units imported by FENOPACI.

The jobs created should be more than 900 for a total production capacity around 4,000 tons (1,800 tons for the OLTREMARE process and 2,400 tons for the Indian one).

The costs for the rehabilitation of the unit should be around CFA 150 millions. We must add 100 millions for the installation of the second unit in the compound.

Creating a Conducive Cashew Industry Environment

NOTE: All this part provides too much detail. It is not necessary to provide recommendations for policy here.

All the above potential partners have different projects about their future actions in the cashew sector but they are all facing the lack of incentives to boost the implementation of the cashew processing industry in the country.

OLAM’s view described above is symptomatic of the situation in which all former processors have been involved. The shortage of support and incentives from the institutions has led to the neglect of cashew processing in Côte d’Ivoire that we are witnessing today.
The OLAM’s Memorandum : “Dossier en faveur de la transformation de l’anacarde en Côte d’Ivoire”

In this Memo, OLAM presents its activity in Côte d’Ivoire and the incentives existing in other producing countries (India, Vietnam, Brazil, Tanzania, Mozambique, Nigeria, Bissau Guinea, Ghana and Mali). These incentives are summarized in the Annex 5.

The main incentives claimed by OLAM are summarized hereafter:

- Exemption of the export tax on the raw nuts (DUS, Droit Unique de Sortie, CFA 10 / kg of nuts) linked to the quantity of the kernels exported during the previous year.

OLAM estimates they are loosing around 260 CFA on each kg of raw nuts they are processing at the moment in Côte d’Ivoire. To compensate this loss, OLAM claims to be exempted of DUS on 26 tons of raw nuts for each ton of kernels they export.

- Information campaign from the Government on the cashew industry

- Special regulations for the cashew industry : wages fixed on the same basis than for the agricultural sector

- Protection for the industry through measures related to the geographical repartition of the units, through the ban of the exporters from the raw nuts market till the month of May (in order to allow the processors to buy the nuts with an acceptable price)

- Investment regulations for the cashew processors:
  - Exemption of all taxes on the import of equipment, spare parts, packaging materials…
  - Total Exemption of Value Added Tax for 10 years.
  - Reduce from CFA 500 millions to 100 millions the level of the amount of the investment which is necessary to take advantage of the “investment code” (which is currently under revision).

Proposal of incentives or support

According to the incentives and support already provided in some countries and to the specific situation of the cashew sector in Côte d’Ivoire, the following measures have been proposed by ARECA, OLAM, other stakeholders or during this mission, and should be taken into consideration when developing a comprehensive industry policy review.

- Incentives or support in favour of the cashew processing in Côte d’Ivoire

  - Exemption of all duties and taxes (including Value Added Tax, VAT) on the import of equipment and spare parts.

  - Exemption of all duties and taxes (including VAT) on the import on packaging materials and all other necessary inputs.

  - Total exemption of VAT for 10 years.

  - Total exemption of tax on land, installed equipment and others assets.
. Total exemption of tax on the turn over.

. Total exemption of tax on the profits.

. Total exemption of tax on all wages for 5 years. This concern all the payments done in favor of the workers regardless of their position, nationality and salary. During that time, all workers are getting and retaining all their rights (retirement, social protection, medical assistance…).

. The cashew processing is considered as a seasonal and agricultural activity for the work regulation. In this case, the minimum salary is lower than in the industrial sector.

. In the Investment Code, the level of the required investment is reduced from CFA 500 millions to 100 millions. A special section of this Investment Code must refer to the cashew processing.

. Another source of support for the cashew processing must be obtained through the decentralized authorities as the “Conseil Généraux”. These organizations are supposed to help the local development. They could help processors to erect buildings or rehabilitate existing assets.

. Government, national organizations and other stakeholders are launching campaigns to promote the cashew kernels consumption in Côte d’Ivoire.

- Changes in the DUS regulations

This point is complex as any modification to the DUS system could have immediate repercussions on the farm gate price of the cashew nut. An increase of the DUS for raw nut importers should lead them to decrease the price they are ready to offer to cooperatives or farmers.

Hereafter are some proposals regarding the change in the DUS system:

→ The Government renounces to the DUS which is now directed into a guarantee fund for the processing industry.

The DUS is still collected but is not going anymore in the State Treasure but is directed into a guarantee fund for the development of the processing industry. This fund could be installed in the BNI (Banque Nationale d’Investissement) or in any other local Bank. The amount which is collected should be CFA 2 billions for an export of 200,000 tons.

Then, investors in cashew processing may be allowed to borrow money with commercial banks under this guarantee fund.

→ Another method more complex could involve an increase in the DUS level, the creation of a guarantee fund and some measures to protect the farmers’ revenue.

The Government creates a guarantee fund for the development of the cashew processing industry.

The Government increases the DUS level to a value of CFA 30 to 50 / kg of nut.
The Government establishes a minimum price acceptable for cashew farmers (between CFA 150 and 250 / kg).

The Government collects all relevant information related to the transaction between sellers and buyers and compensates the possible differences (between the actual farm gate price and the minimum price) with the money collected with the DUS. This compensation could be given in cash to the farmers or in various inputs (fertilizers…).

The remaining money is directed into the guarantee fund and can be used in various incentives to sustain the processing industry (for instance, with grants for improving the units like in India).

⇒ The OLAM’s proposal: the loss of 260 CFA per kg of raw nut seems to be heavily overestimated and its calculation could be discussed in detail. This proposal should also imply that all processors should also be exporters of raw nuts (or it will introduce some discrepancy between processors).

**Securing the supply of the processing factories**

Even in presence of adequate incentives such as those detailed before insupport to the processing industry, the access to the raw material will always be a major concern for the processors.

The Indian exporters can put pressure on the local market in order to fill their contracts, fill their factories in India or even to lock the door for the Ivorian cashew industry. In any of these cases (for instance in 2002), the price of the raw nut on the Ivorian market could be totally disconnected from the price of the kernels on the international market. Then, the profitability of the processing would be uncertain, making it necessary to close the unit.

Before going into one year of processing, the potential processors would benefit from having a clear vision of the average price of its stock of raw nuts. A mean to obtain such perspective could be to finalize a supply agreement with one or more cooperatives. This agreement can include the pre-funding of the cooperatives by the processor. The funds could be release some months before the cashew nuts harvest, for instance before the beginning of the school year.

In the case of a joint venture between a processor and a cooperative for the implementation of some small scale processing units, the agreement for the supply of the factory would of course be part of a more general contract between the processor and the cooperative(s).

The government may help to secure the supply of the cashew processing units. To fulfil this mission, the agencies in charge of the cashew sector should have a deep knowledge of all the processing costs, from the purchase of the raw nuts to the sales of the kernels. These costs would be communicated to all stakeholders, and assessed during the technical assistance for setting up the various processing projects. A similar approach to production may be also considered.

**NECESSARY PROGRAM TO UNLOCK THE OPPORTUNITY**

**Technical assistance for the development and implementation of the incentives in favor to the cashew processing industry**

The measures which have been exposed above will have to be further studied, explained and negotiated with the Ivorian Authorities and other stakeholders of the cashew sector prior to
The bodies responsible for it, such as ARECA, will need assistance at all stages, especially leveraging on the experience of other cashew producing countries.

This assistance should be funded by the World Bank and executed by an experienced NGO or consultant firm.

**Technical assistance for setting up projects and following their implementation**

There are some existing facilities and potential investors in Ivorian cashew processing. However, there are difficulties in setting the current industry players on the most productive and efficient track.

This is particularly obvious in the case of the FENOPACI. The opportunity of the import of the units has been taken and after has appeared the need to understand the activity and the business. In fact, FENOPACI was created to establish itself in the cashew sector and now they are looking for assistance in order to fulfil the missions they have contracted with the farmers, cooperatives and authorities.

FENOPACI has recently emerged as a major stakeholder of the sector; the units are there; the “bourse de l’Anacarde” has been launched. Then, if the appropriate assistance is not supplied to FENOPACI, they may choose to implement their business by themselves or with some help which could be inappropriate. In this case, the project could fail and the cashew sector of Côte d’Ivoire could waste a few more years.

A similar story applies to SITA. They are also a major stakeholder in the sector, and they similarly need assistance in the set up of a consistent project. The same idea must lead to set up a project and find a viable partner for the Korhogo’s unit. Plenty of people with a lot of experience in the cashew processing are available in this city and it is possible to restart the processing activity swiftly.

So, we are suggesting the supply of a technical assistance to built and start the implementation of valid projects in all these cases.

The objectives of this assistance should be the following:

. Preparing the full organization of the projects in terms of equipment, staff, production costs, inputs supply, raw nuts procurement, etc.

. All the data related to the production costs, from the purchase of the nuts to the sales of the kernels on the international market will be made available to all the main stakeholders of the cashew sector in order to fulfil their need of a clear knowledge of the stakes of the cashew processing industry.

. Elaborating a full and detailed guide for the running of the units

. Writing a valid business plan

. Finding importers and getting their interest for the future kernel production
Following the implementation of the project

This assistance should be given through a selected NGO or consultant firm and should require consultant with proven experience in the management of cashew processing unit.

In order to obtain the maximum efficiency of this assistance, an agreement should be established between the funding agency and the beneficiary. This one should provide all relevant information needed.

The possible release of additional funds to sustain the project must be linked with the commitment of the beneficiary to follow all recommendations and instructions established during the assistance phase.

**Technical assistance to develop processing industries for cashew apple and cashew by-products**

- **Pilot project for the processing of the cashew apple juice into ethanol**

  Theoretically, the cashew apple juice should be process into ethanol with the following process:
  - Apples collection and washing
  - Juice extraction (and possible de-tanning)
  - Juice fermentation into a 10 alcoholic degree liquid (wine)
  - Filtering the fermented juice
  - First distillation of the wine into alcoholic mixture
  - Water addition and rinsing
  - Second distillation, alcohol separation and pure ethanol collection

  This process must be verified, refine and approved with some specialists of the alcohol production and through a pilot processing unit.

  An estimate cost of this pilot project should be about CFA 50 – 100 millions (USD 100,000 – 200,000).

- **Program: implementation of the FENOPACI’s CNSL plant**

  The CNSL processing unit imported by FENOPACI should be installed by the Indian company which has sold it. In case of difficulties in this implementation or in the start of the operation, we can propose a joint program between FENOPACI and a selected NGO or firm to unlock the problem. In this case, all results obtained from the program should be shared with all other potential processors of Côte d’Ivoire.

  Some various chemical industries of Côte d’Ivoire could be interested in this program as CNSL has a wide range of uses (varnishes, paints etc.).

**Technical assistance for training**

Various different training programs exist in cashew processing as well as cashew production. They have been developed by the agencies dealing with agriculture sector in Côte d’Ivoire (FIRCA, ARECA, CNRA, FAO, INADES/RONGEAD, STCP…).

In the set up of some cashew processing units there will be some request of training assistance,
especially in the case of the ex-combatants. A comprehensive training program focused on the absorption of ex-combatants must be developed, in collaboration between the relevant institution, the processors, and an specialised agency.

**Technical assistance for the assessment of the production costs of the raw nuts**

There is an usual misunderstanding on the actual costs of the production of the raw nuts at the farm level. All the available data are not very reliable (it has been pointed out in the “Cashew Producers” part (above). To clarify that specific point, we propose a full study on these production costs.

The study should be done by a neutral experienced organization and through various surveys in the producing areas of Côte d’Ivoire. The support of the producers organizations will be required.

**Reactivating former organic production areas**

It could be of interest to support the potential investors in the reactivation of the former organic certified producers of cashew nuts. This should be an advantage for the processors (to gain additional revenue) and for the producers (to secure the sale of their product at a reasonable price).

**Attracting new investments**

In order to fulfil the vision of a well developed cashew processing industry, it is crucial not only to collaborate with current players, but also to attract new investors.

This can be achieved via the establishment of an enabling environment conducive to investment, as detailed above. Given the current reluctance of many investors to invest in Cote d’Ivoire, this should be developed in collaboration with prospective investors, and could comprise of extra services such as technical assistance, facilitated funding opportunities, etc.

As the appropriate incentives exposed above will have been implemented, ARECA is already planning to lobby in favour of the industry. ARECA may use the services of a specialised agency to this purpose.

**Priorities**

In synthesis, the activities recommended include:

1. Policy review
2. Assistance to current processing operators
3. Study of production costs
4. Development of a cashew by-products industry
5. Development of niche opportunities such as organic
6. Assistance and training to processors
7. Development of an environment conducive to investment in the processing industry (lobbying, technical assistance, funding)

While the first three items can be acted upon immediately and tackled via one-off, 4-6 weeks,
projects, the successful execution of the remaining ones require the set up of a long-term program (eg., 2-3 years), to ensure the continuity of technical services, training, development of the by-product industry, advocacy and lobbying.
### OLTREMARE technology and the Indian technology

#### Advantages and drawbacks

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<thead>
<tr>
<th><strong>OLTREMARE TECHNOLOGY</strong></th>
<th><strong>INDIAN TECHNOLOGY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>+</strong> High ratio production capacity / required surface</td>
<td>Production capacity easy to adjust and expand</td>
</tr>
<tr>
<td>Good organoleptic quality of the kernels</td>
<td>Low investments costs</td>
</tr>
<tr>
<td>Easy peeling</td>
<td>Low maintenance costs</td>
</tr>
<tr>
<td>Quick learning of the shelling</td>
<td>Very low electricity consumption</td>
</tr>
<tr>
<td><strong>-</strong> High investment costs</td>
<td><em>High percentage of white whole kernels</em> (Cooking and Shelling easy to handle)</td>
</tr>
<tr>
<td>High maintenance costs</td>
<td></td>
</tr>
<tr>
<td>High electricity consumption</td>
<td></td>
</tr>
<tr>
<td>Production capacity difficult to adjust</td>
<td>Low ratio production capacity / required surface</td>
</tr>
<tr>
<td><em>High percentage of scorched kernels</em> (Cooking difficult to handle)</td>
<td>High labor intensity</td>
</tr>
<tr>
<td><em>High percentage of broken kernels</em> (Breaking by the semi automatic shelling)</td>
<td>Peeling often difficult</td>
</tr>
<tr>
<td></td>
<td>Slow learning of the shelling</td>
</tr>
<tr>
<td></td>
<td>CNSL corrosive action on worker’s hand</td>
</tr>
</tbody>
</table>
### Annex 2

**Small Scale Processing Unit for Cashew Nuts**

**Investments and production costs**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Daily Worker 1,200 CFA / day</th>
<th>Technician 2,000 CFA / day</th>
<th>Supervisor 3,500 CFA / day</th>
<th>Cutting Machine 10 Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Capacity</td>
<td>150 tons / year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw nuts processed</td>
<td>500 kg / day for 300 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kernels Yield</td>
<td>20%</td>
<td></td>
<td></td>
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</table>

#### Working section

<table>
<thead>
<tr>
<th>Working section</th>
<th>STAFF</th>
<th>Inputs</th>
<th>MATERIALS &amp; EQUIPMENT</th>
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<tbody>
<tr>
<td><strong>Warehouse</strong></td>
<td></td>
<td></td>
<td><strong>Work</strong></td>
</tr>
<tr>
<td><strong>Cooking</strong></td>
<td>Daily worker</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shelling</strong></td>
<td>Daily worker</td>
<td>30</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oil</td>
<td>3</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drying</strong></td>
<td>Technician</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Peeling - Grading</strong></td>
<td>Daily worker</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Roasting - salting</strong></td>
<td>Daily worker</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bags</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Labels</td>
<td>3</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td></td>
<td>Inputs</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>51</td>
<td>124</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Depreciation</td>
<td>1,515,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CFA / kg nuts</td>
<td>30</td>
<td>14</td>
</tr>
</tbody>
</table>

**Total production costs**

- 194 CFA / kg of nuts processed
- 970 CFA / kg of kernels

---

<table>
<thead>
<tr>
<th>Parameters</th>
<th>1,200 CFA / day</th>
<th>2,000 CFA / day</th>
<th>3,500 CFA / day</th>
<th>10 Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Capacity</td>
<td>150 tons / year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw nuts processed</td>
<td>500 kg / day for 300 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kernels Yield</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 3

5,000 tons cashew nuts processing unit

**ORGANIZATION**

275 batches (days) – 18 tons / batch (day)

**EQUIPMENT**

1. **Buildings and layout.**

   We advise to plan larger space than necessary in order to allow some future expansion or the installation of new equipment.

   For the storage of raw nuts, clear and spaced piles of bags not higher than 6 or 7 bags are counseled. The different lots should be clearly identifiable (origin, trucks…) and checked. The room must be very well aerated.

   For the storage of finished products (cartons of kernels), it is also of extreme importance to be able to physically control the stock.

   The working areas must be divided into the main working sections, the biggest of them being the shelling section, the peeling section and the grading section. In these three sections, workers should have enough space to move freely and ensure low hygienic hazards. Cooking section and drying section must be separated from the high labor intensity section.

   The packing section must be installed in a cool and very clean room closer to the warehouse for finished products. This last one must be a completely closed room.

   All working areas should be installed following the processing steps.

   The following surfaces are rough estimates which be refined:

   - Warehouse for 5,000 tons of raw nuts    2,500 m2
   - Warehouse for cashew kernels         500 m2
   - Working areas                        4,000 m2
   - Offices and other premises          1,000 m2
   - Grounds                             2,000 m2
     (Drying & cooling areas, trucks movements etc.)

2. **Warehouse**

   The need for a weighing bridge can be discussed (to avoid the expense) if there are some weighing facilities around the factory. Another weighing scale is needed for the movement of the nuts inside the factory.

   The forklift is necessary to carefully and quickly handle the bags of nuts.
- Weighing bridge
- Other scaling machine
- Forklift
- Other materials (pallets …)

3. Cooking

Usually the steam cookers made in India have a capacity of 4 bags and one steamer is supplying 2 cookers. The steam is generated through the energy of the combustion of cashew shells.

A full shift takes less than ½ h and just 5 to 10 minutes for the actual cooking.

Within one day of 8 working hours, one cooker can handle 64 bags or 5 tons of raw nuts.

After cooking, the nuts must be spread over a ground covered by smooth concrete.

- Cookers: 4 cookers – 1,280 kg / 0.5 h – 8 hours
- Steamers (fuelled with cashew shells): 2
- Small equipment

4. Shelling

The shelling section with typical Indian manual cutting machines required a large surface in an aerated room. Workers are stood up behind the machine of seated on a high stool.

Each machine can be served by two (even three workers), one is cutting the nuts and the other one is separating the kernels from the shells. The workers are exchanging their place during the day. An objective of 50 kg of raw nuts processed per machine and per day with two workers is a minimum for an efficient and profitable work. At CAJOUCI, each machine was processing 100 kg of nuts per day with 3 women.

It is more efficient to organize the workers into teams managed by a chief. In this case, one supervisor is enough to control all the work. Teams can compete each week for the higher percentage of kernels and for the higher percentage of whole kernels. These competitions are awarded with some extra salary (bonus).

All quantities (nuts, wholes kernels, pieces, wastes) are weighed for each team before and after the cutting (the weighing for each machine is a very long and often useless job).

Taking into consideration the corrosive effects of the CNSL on the hands of the workers is of extreme importance. The use of gloves is often inefficient and very expensive. The best way to manage the problem is to use oil such as palm oil to protect the skin of the workers (in India they are using coconut ashes).

- cutting machine: 360 machines – 50 kg / day and / machine
- Required surface and equipment for 720 workers
- One electronic scale (scaled up to 300 kg)
- Small equipment
5. Drying

The kernels covered by their skin coming from the shelling must be dried before peeling. The drying is supposed to reduce the moisture of the kernels under 4%. The drying is done in a hot room and takes around 6-8 hours at 70-80ºC. The hot air is produced by the combustion of cashew shells. The fireplace used can be the same than the one used for cooking (If it is possible). The hot air produced by the combustion does not go in the hot room but circulate in its walls.

The kernels are spread on stainless steel perforated trays in a fin layer (2-4 cm) and the trays are loaded on trolleys. The trolleys are introduced in the hot room and the doors are locked.

The time required to dry the pieces is obviously shorter than for the whole kernels.

Before and after drying, all quantities are weighted (co-weighing with the supervisors of the shelling and the peeling).

It is obvious that the decrease in the weight of the kernels could not be greater than the decrease in the moisture (but it must be checked).

- Full set of dryers – trolleys – trays for the drying of 3.6 – 4 tons of kernels / day
- Hot air generator or steamers (fuelled with cashew shells) and insulated pipes

6. Peeling

This working section is usually the bottleneck of the efficiency of the processing in terms of yield in kernels and for the percentage of whole kernels.

We assume that the quantity of kernels processed per day and per worker is around 15 kg. This figure can be lower as the steam cooking generally produce kernels more difficult to peel (than other way of cooking).

The work can be done by hand or with an adapted small knife.

It is highly recommendable to organize the workers into several teams all managed by one chief. One or two supervisors control the section. Teams can compete each week in competition for the higher percentage of kernels and for the higher percentage of whole kernels.

Before and after peeling, all quantities (wholes kernels, pieces, spotted kernels, kernels wastes, skins) are weighted (co-weighing with the supervisors of the drying and of the grading).

- Required surface and equipment for 360 workers
- Electronic scale

7. Grading

The grading is supposed to sort kernels into the various and numerous grades which have to be separately packed. The organization of the work has to be very accurate as the kernels often need to go and back for different works (work on spotted kernels for instance).
The organization into teams will not be possible before the production manager and the supervisors have acquired a deep knowledge of the work and of the efficiency of the workers.

Before and after grading, all quantities (whole kernels, pieces, wastes, etc.) are weighted (co-weighing with the supervisors of the peeling and of the packing).

- Required surface and equipment for 240 workers
- Electronic scale

8. Packaging

The supervisor of the packing must be responsible of the quality of the kernels received and must be able to send back quantities which have not been properly prepared.

Vacuum packing must be done into plastic pouch of 25 lb (11.34 kg) or 50 lb (22.68 kg). Two (or one) pouches are loaded into one carton. Doing a neutral gas injection (CO2 – N2) before creating vacuum insure a better and longer shelf life of the product.

- Vacuum packing machine and all equipment
- Electronic scale

9. Lab

The lab is in charge of assessing the quality of the nuts which are purchased by the processing unit or which are entering in the daily production. Without a deep knowledge of the outturn (potential yield) of the nuts you can not be able to assess the efficiency of your process.

The lab is also in charge of some controls all along the process (moisture, quality, hygiene etc.).

- Scales and all equipment

INVESTMENTS, STOCK OF RAW MATERIAL AND WORKING CAPITAL

1. Equipment: CFA 420 millions (USD 0.820 million)
2. Buildings: CFA 600 millions (USD 1.180 millions)
3. Raw cashew nuts stock: CFA 1 billion (USD 2 millions)
4. Working capital: CFA 240 millions (USD 0.5 millions)

PROFITABILITY – RUNNING ACCOUNT

The attached simulation is done under several hypothesis on the value of different parameters:

- price of the raw cashew nuts (minimum 150, maximum 250, average 200 CFA / kg)
- variable costs (minimum 100, maximum 150, average 125 CFA / kg)
- fixed costs (minimum 25, maximum 75, average 50 CFA / kg)
- yield in cashew kernels (minimum 20%, maximum 21%, average 20.5%)
- exchange rate of the US dollar (510 CFA / USD)
- international price of the grade W320 (2.15 USD / lb)

With the average value of these parameters, the exchange rate of the US dollar and the current price of the W320, the brut margin of the running of this unit could be around CFA 410 millions.

The extreme values of this brut margin are between CFA –200 millions and CFA 1 billion.

The current value of the W320 price and of the US dollar should not be very favorable to the running of such unit if the price of the raw nuts is more than CFA 200 / kg.

We have not taken into consideration the potential additional revenue (and profit) which can be found in the process and marketing of the by-products.

We may also add that the depreciation costs for the unit should be around CFA 95 millions (USD 190,000) with the following details: CFA 65 millions for the equipment and CFA 30 millions for the buildings.
## 1. Investment for equipment

<table>
<thead>
<tr>
<th>Non production assets</th>
<th>minimum</th>
<th>maximum</th>
<th>Average Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity - water</td>
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<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Office equipment</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>General layout</td>
<td>30</td>
<td>60</td>
<td>45</td>
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<tr>
<td>Small equipment</td>
<td>20</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Vehicles</td>
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<td>30</td>
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<tr>
<td>Maintenance equipment</td>
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<td>20</td>
<td>15</td>
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<tr>
<td>Warehouse</td>
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</tr>
<tr>
<td>Weighing bridge</td>
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<td>30</td>
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<tr>
<td>Sorters</td>
<td>15</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Drying area</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Scales</td>
<td>5</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Forklift</td>
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<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Cooking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steamers &amp; cookers</td>
<td>20</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Cooling area</td>
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<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Shelling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cutting machines</td>
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</tr>
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<td>Unit costs (CFA)</td>
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<td>Total cost</td>
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<td>54</td>
</tr>
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</tr>
<tr>
<td>Small equipment</td>
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<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Drying</td>
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</tr>
<tr>
<td>Steamers</td>
<td>8</td>
<td>12</td>
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<tr>
<td>Trolleys – Trays</td>
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<td>15</td>
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<tr>
<td>Drier &amp; equipment</td>
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<td>50</td>
<td>40</td>
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</tr>
<tr>
<td>Small equipment</td>
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<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Grading</td>
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<tr>
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<td>Small equipment</td>
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<td>8</td>
<td>6</td>
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<td>Packing</td>
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<tr>
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<tr>
<td>Packing machine</td>
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<tr>
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<td>4</td>
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</tr>
<tr>
<td>Lab</td>
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<tr>
<td>Scales &amp; equipment</td>
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<td>2</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td><strong>550</strong></td>
<td><strong>419</strong></td>
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<table>
<thead>
<tr>
<th>Building</th>
<th></th>
<th></th>
<th>USD millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>price / m2 (CFA)</td>
<td>50,000</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total surface required</strong> m2</td>
<td><strong>8,000</strong></td>
<td><strong>400</strong></td>
<td><strong>800</strong></td>
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</table>

## 2. Raw cashew nuts stock

<table>
<thead>
<tr>
<th>Purchase</th>
<th>unit cost (CFA / kg)</th>
<th>quantity (T.)</th>
<th>millions CFA</th>
<th>USD millions</th>
</tr>
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<tbody>
<tr>
<td>200</td>
<td></td>
<td>5,000</td>
<td>1,000</td>
<td>1,961</td>
</tr>
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</table>

## 3. Working Capital/3 months

<table>
<thead>
<tr>
<th></th>
<th>unit cost (CFA / kg)</th>
<th>quantity (T.)</th>
<th>millions CFA</th>
<th>USD millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>175</td>
<td></td>
<td>1,364</td>
<td>239</td>
<td>0,468</td>
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</table>

**Nota bene**: CFA/USD 510
Organization of a 5,000 tons processing unit

<table>
<thead>
<tr>
<th>Objective</th>
<th>5,000 Tons</th>
</tr>
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<tbody>
<tr>
<td>Months</td>
<td>11</td>
</tr>
<tr>
<td>Weeks</td>
<td>48</td>
</tr>
<tr>
<td>Days</td>
<td>275</td>
</tr>
<tr>
<td>Days/week</td>
<td>6</td>
</tr>
<tr>
<td>Kg / day</td>
<td>18.0 Objective 50 360 cutting machines</td>
</tr>
<tr>
<td>Kg / day</td>
<td>18.2 Theory 75 240 cutting machines</td>
</tr>
<tr>
<td>Shelling</td>
<td>11.129 Mx 360 cutting machines</td>
</tr>
<tr>
<td>Peeling</td>
<td>240</td>
</tr>
<tr>
<td>Grading</td>
<td>240</td>
</tr>
<tr>
<td>Payment</td>
<td>120 CFA/kg W 30 CFA/kg Mx</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooking</th>
<th>56 with 4 cookers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>8 H</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shelling</th>
<th>50 kg/machine for 360 machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>75 kg/machine for 240 machines</td>
</tr>
<tr>
<td>90%</td>
<td>4,860 kg kernels</td>
</tr>
<tr>
<td>10%</td>
<td>540 kg kernels</td>
</tr>
<tr>
<td></td>
<td>583,200 CFA</td>
</tr>
<tr>
<td></td>
<td>833 CFA/worker</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peeling</th>
<th>4,950 kg kernels</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.50%</td>
<td>13.8 kg/worker</td>
</tr>
<tr>
<td>22%</td>
<td>3,960 kg kernels</td>
</tr>
<tr>
<td>75%</td>
<td>2,970 Wholes</td>
</tr>
<tr>
<td>25%</td>
<td>990 Pieces</td>
</tr>
<tr>
<td></td>
<td>297,000 CFA</td>
</tr>
<tr>
<td></td>
<td>825 CFA/worker</td>
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</table>

<table>
<thead>
<tr>
<th>Grading</th>
<th>3,960 kg kernels</th>
</tr>
</thead>
<tbody>
<tr>
<td>22%</td>
<td>17 kg/worker</td>
</tr>
<tr>
<td>65%</td>
<td>2,399 Wholes</td>
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<td>35%</td>
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<td>202,950 CFA</td>
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<tr>
<td></td>
<td>846 CFA/worker</td>
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<table>
<thead>
<tr>
<th>Weekly Bonus</th>
<th>10 teams average % of whole kernels of the week</th>
</tr>
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<tbody>
<tr>
<td>Total / week</td>
<td>100,000</td>
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</table>

<table>
<thead>
<tr>
<th>CFA/kg nuts</th>
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<td>33.3</td>
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<th>10 first teams for yield, 10 first teams for % W</th>
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<td>Total / week</td>
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<thead>
<tr>
<th>CFA/kg nuts</th>
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<th>Weekly Bonus</th>
<th>10 teams average % of whole kernels of the week</th>
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<tbody>
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<td>100,000</td>
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<th>CFA/kg nuts</th>
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<thead>
<tr>
<th>Weekly Bonus</th>
<th>10 first teams for yield, 10 first teams for % W</th>
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<td>Total / week</td>
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<thead>
<tr>
<th>Weekly Bonus</th>
<th>10 first teams for yield, 10 first teams for % W</th>
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<tbody>
<tr>
<td>Total / week</td>
<td>100,000</td>
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<table>
<thead>
<tr>
<th>CFA/kg nuts</th>
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### 5,000 tons cashew nuts processing unit: STAFF AND WAGES

<table>
<thead>
<tr>
<th></th>
<th>Full time workers</th>
<th>CFA/month</th>
<th>Bonus</th>
<th>Supervisors</th>
<th>CFA/day</th>
<th>Bonus</th>
<th>Daily Workers</th>
<th>CFA/day</th>
<th>Bonus</th>
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<tr>
<td>Warehouse</td>
<td>1</td>
<td>120,000</td>
<td>50%</td>
<td>2</td>
<td>1,500</td>
<td>25%</td>
<td>23</td>
<td>1,000</td>
<td>200</td>
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<tr>
<td>Purchasing period</td>
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<tr>
<td>Lab</td>
<td>1</td>
<td>120,000</td>
<td>50%</td>
<td>4</td>
<td>1,500</td>
<td>25%</td>
<td>696</td>
<td>800</td>
<td>200</td>
</tr>
<tr>
<td>Cooking</td>
<td>2</td>
<td>80,000</td>
<td>50%</td>
<td>4</td>
<td>1,500</td>
<td>25%</td>
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<tr>
<td>Shellings</td>
<td>1</td>
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<td>50%</td>
<td>24</td>
<td>1,000</td>
<td>200</td>
<td>696</td>
<td>800</td>
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<tr>
<td></td>
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<td>80,000</td>
<td>50%</td>
<td>4</td>
<td>1,500</td>
<td>25%</td>
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<tr>
<td>Lab</td>
<td>1</td>
<td>80,000</td>
<td>50%</td>
<td>4</td>
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<td>1,000</td>
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<td>300</td>
<td>800</td>
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<tr>
<td>Drying</td>
<td>1</td>
<td>80,000</td>
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<td>20</td>
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<td>220</td>
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<tr>
<td>Grading</td>
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<td>50%</td>
<td>4</td>
<td>1,500</td>
<td>25%</td>
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<tr>
<td>Packing</td>
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<tr>
<td>Maintenance</td>
<td>2</td>
<td>120,000</td>
<td>50%</td>
<td>4</td>
<td>1,500</td>
<td>25%</td>
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<tr>
<td>Cleaning, Toilets</td>
<td>1</td>
<td>350,000</td>
<td>50%</td>
<td>6</td>
<td>1,000</td>
<td>25%</td>
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<tr>
<td>Production Manager</td>
<td>1</td>
<td>1,500,000</td>
<td>50%</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Dep. Manager</td>
<td>1</td>
<td>250,000</td>
<td>50%</td>
<td></td>
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<tr>
<td>Statistician</td>
<td>2</td>
<td>80,000</td>
<td>50%</td>
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<tr>
<td>Administration</td>
<td>1</td>
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<td>50%</td>
<td></td>
<td></td>
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<tr>
<td>Managing Director</td>
<td>1</td>
<td>1,500,000</td>
<td>50%</td>
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<td></td>
<td></td>
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<tr>
<td>Accountant</td>
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<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Human resources</td>
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<td>50%</td>
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<td></td>
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<tr>
<td>Drivers</td>
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<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Watchmen</td>
<td>6</td>
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<td></td>
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<tr>
<td><strong>TOTAL Workers</strong></td>
<td><strong>26</strong></td>
<td></td>
<td></td>
<td><strong>104</strong></td>
<td></td>
<td></td>
<td><strong>1246</strong></td>
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<tr>
<td><strong>Costs</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CFA millions /month</td>
<td>4.3</td>
<td>2.1</td>
<td>CFA / day</td>
<td>116,000</td>
<td>29,000</td>
<td>CFA / day</td>
<td>996,800</td>
<td>249,200</td>
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<tr>
<td>Costs / kg raw nuts</td>
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<td></td>
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<tr>
<td></td>
<td>Tons of nuts / month</td>
<td>450</td>
<td></td>
<td>Tons of nuts / day</td>
<td>18</td>
<td></td>
<td>Tons of nuts / day</td>
<td>18</td>
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<tr>
<td></td>
<td>CFA / kg</td>
<td>9.5</td>
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<td>CFA / kg</td>
<td>6.4</td>
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<td>CFA / kg</td>
<td>55.4</td>
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<td></td>
<td>CFA / kg</td>
<td>4.7</td>
<td></td>
<td>CFA / kg</td>
<td>1.6</td>
<td></td>
<td>CFA / kg</td>
<td>71.3</td>
<td>20.2</td>
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**Total Workers**: 1376
Simulation of the running of a 5,000 tons cashew processing unit

<table>
<thead>
<tr>
<th>Raw Cashew Nuts</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
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<tbody>
<tr>
<td>RCN price</td>
<td>150</td>
<td>250</td>
<td>750 000 000</td>
<td>1 250 000 000 CFA</td>
<td>1 000 000 000 CFA</td>
</tr>
<tr>
<td>Jobs / tons / year</td>
<td>0.25</td>
<td>0.3</td>
<td>1 250</td>
<td>1 500</td>
<td>1 375 jobs</td>
</tr>
<tr>
<td>Costs (CFA / kg of nuts)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable wages</td>
<td>100</td>
<td>150</td>
<td>500 000 000</td>
<td>750 000 000 CFA</td>
<td>625 000 000 CFA</td>
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<tr>
<td>Fixed</td>
<td>25</td>
<td>75</td>
<td>125 000 000</td>
<td>375 000 000 CFA</td>
<td>468 750 000 CFA</td>
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<tr>
<td>Sales</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cashew kernels yield</td>
<td>20%</td>
<td>22%</td>
<td>1 000</td>
<td>1 100 tons of kernels</td>
<td>1 050 tons of kernels</td>
</tr>
<tr>
<td>Cashew kernels prices</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W320</td>
<td>2.15 USD / lb</td>
<td>4.74 USD / kg</td>
<td>510 CFA / USD</td>
<td>2 417 CFA / kg</td>
<td></td>
</tr>
<tr>
<td>All kernel grades</td>
<td>90%</td>
<td></td>
<td>2 176 CFA / kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis 1</td>
<td>1 756 432 020</td>
<td>2 393 207 522 CFA</td>
<td>2 284 425 362 CFA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>Equipment</td>
<td>Minimum</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>750 000</td>
<td>1 000 000 USD</td>
<td>821 569 USD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buildings</td>
<td>Minimum</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 000 m2</td>
<td>1 568 627 USD</td>
<td>1 176 471 USD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CFA/m2</td>
<td>Minimum</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 000</td>
<td>100 000</td>
<td>600 000 000 CFA</td>
<td></td>
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<tr>
<td>Brut Margin (without depreciation costs)</td>
<td>Hypothesis 1</td>
<td>-199 356 798</td>
<td>800 643 202 CFA</td>
<td>409 425 362 CFA</td>
<td></td>
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<tr>
<td></td>
<td>Hypothesis 2</td>
<td>18 207 522</td>
<td>1 018 207 522 CFA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 5

Support and Incentives of cashew producing countries in favor of the processing industry

India
- Ban on the export of the raw nuts (high tax rate)
- Grants in favor of the improvement of the quality of the cashew kernels
  . Subsidy for equipment required for export of cashew in consumer packs
  . Subsidy for equipment for improvement in processing cashew
  . Subsidy for getting certification (ISO, HACCP…)
  . Subsidy for adopting flexi-pouch vacuum packing systems
  The rate of subsidy would be 25% of the investment with a maximum of Indian Roupies 800,000 (USD 17,500)
- “Duty entitlement pass book scheme”: 1% incentive for export
- Incentives for the export of all agricultural products is of 5%

Vietnam
- Ban on the export of the raw nuts (24% export duty, to be verified)
- Work legislation consider the cashew processing as an seasonal and agricultural activity

Brazil
- Ban on the export of the raw nuts (40% export duty, to be verified)

Tanzania
- Memorandum of understanding between the Government of the United Republic of Tanzania and cashew nut processors on promoting cashew nut processing in Tanzania.
  . Date of effect October 1, 2005
  . Implementing an 8.5 % Industry Development levy on the export of raw cashew nut, based on FOB value
  . Cashew nut processors agree to process up to 80,000 tons of cashew nut by 2009/10
- Reduced prices for infrastructures
- Active administrative support
- Tax exemption on the imports of processing equipment
- Work legislation consider the cashew processing as an seasonal and agricultural activity
- Some tax exemption at the village level
Mozambique

- Reduced prices for infrastructures
- Active administrative support
- New investment code
- 18% tax on the export of the raw nuts (on a FOB value of USD 700)

Nigeria

- High subventions for processing industry under the program “Export expansion grant scheme”

Bissau Guinea

- High level of the tax on the export of the raw nuts (to be verified)
- Investment code
- Should announced tax exemption on the export of raw nuts depending on the quantity of kernels exported ((to be verified)

Ghana

- In spite of the low level of their cashew production (10,000 tons), the Government is working on a scheme to help investors in order to process 100% of that production
- The Ghana Free Zone Act should be studied carefully