Value Added
Tomato Processing in Mali

An Examination of Possibilities
For the Irrigated Zone in Baguinéda

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Value Added Tomato Processing in Mali
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Executive Summary

The tomato producers in Baguinéda, and throughout Mali, have a fairly well circumscribed set of options for adding value to their existing tomato production. The objective of this study was to examine these options and determine whether any of them represent a viable alternative for the tomato producers in the Irrigated Zone of Baguinéda.

The value-added options examined in this study were: tomato paste production (industrial scale), small scale tomato sauce production, dehydrated tomato production and sun dried tomato production. Of these, it appears that only tomato paste production on an industrial scale makes real sense for the growers in Baguinéda, but with certain caveats.

Baguinéda is a clearly defined production zone located along the Niger River, about 35 km from Bamako. This zone is approximately 95 Ha and is fully irrigated via a canal system shunted off the Niger River.

Rice is the primary crop grown in this zone during Mali’s rainy season. On lands outside of the rice paddies, the tomato nurseries are prepared in August and outplanted in mid-Aug/September. Most of the tomato production, along with various other vegetable crops, such as; cucumber, okra, melon, sweet pepper, hot peppers and onion, occurs in the irrigated zone after the rice season (December/January) and continues throughout the dry season; mid-April-May. The months from February through April are considered the high season for tomato production. Tomato production goes up and prices plummet during this period. It appears, however; that the Malian market for fresh tomatoes can absorb the level of production that Baguinéda (and other production zones such as the Office du Niger) can put into the market. It is just that the prices drop to a level at which most farmers are discouraged, but not completely inhibited, from growing tomatoes for this market.

Somaco was a para-statal tomato paste factory constructed in Baguinéda in 1964. This factory operated to varying degrees until 1998; after which it was completely shut down. The factory produced primarily double concentrated tomato paste (28% MC), but also delved into the production of juice packets (ala Capri Sun). This factory absorbed the vast majority of the tomatoes produced on the parcels of Baguinéda and was the reason that tomato production in the irrigated zone remains prevalent today.

At the time that SOMACO was in full operation, it was said that the growers of Baguinéda obtained a yield of 40MT/Ha. Today the yields are nearer to 20MT/Ha. It would seem that production has dropped off as a function of the decreased demand due to the closing of the factory. Indeed, 20MT/Ha is rather low for most industrial production settings. With proper varietal selection, irrigation and fertilization most industrial tomato plantations now obtain between 90-120 MT/Ha.
The market for fresh tomatoes in Mali is quite large. The three major markets in Bamako, which are presumed to serve the large majority of Bamako’s 1.6 million residents, are estimated to circulate a volume of about 12,000 MT/yr.

Prior to the execution of this study, there was some enthusiasm around the possibility of creating a small-scale tomato sauce/paste manufacturing facility. An existing enterprise of this scale already exists in Bamako and this enterprise was examined as a case study to determine the viability of such a facility to resolve the problems faced by the growers in Baguinéda. This case study proved that the market for such a product is very limited and the duplication or enlargement of such an enterprise could have little impact on the needs of the Baguinéda growers since the volumes of tomatoes produced in Baguinéda largely outstrip the available market for tomatoes processed by these methods.

Also examined were two case studies on dehydration. Dehydrated tomatoes would seem to present strong potential in Mali because of the climatic conditions that exists, however; strictly speaking, dehydrated tomatoes are often used as secondary ingredients by large multi-national firms are commonly produced in enclosed ovens that are heated by steam or fuel oil. The standards for quality (size, shape, consistency and microbiological content) are very high, thus open air drying for this product is not acceptable. As such, production of dehydrated tomatoes will also require external energy sources, putting Mali at an immediate competitive disadvantage due to the high price of electricity and other forms of energy. The potential of each of these industries to absorb some of the production capacity in Baguinéda and add value that production was examined in this study.

Finally, we looked at the possibility of producing sun dried tomatoes. This product, because the capital investments are relatively low-cost and scalable to the volumes produced and also because it is a labor-intensive activity, has some potential to solve the problems for the Baguinéda growers. There are, however; two major drawbacks to this possible solution. One is that this product would not be destined for the domestic market as would tomato paste. This would be exclusively an export crop and one for which neither Mali, nor even any country in West Africa has any history of production. Secondly there is the effect that the dust from the Harmattan winds and the general air quality during the dry season would have on the inorganic matter content and microbiological content of the sun dried product.

In conclusion, it was determined that the best place for the IICEM to invest its effort and financial resources would be to assist the entrepreneurs of the New SOCAM S.A to get their project approved at the ministerial level in Mali. This would create a large and immediate demand for tomatoes from Baguinéda and the project could then concentrate on raising the farmers’ yields with the certainty of a guaranteed market for their product. However; until the SOCAM plant is up and running, the new dried factory in Tienfala run by Malisol represents a potential market for processing tomatoes. Although this facility intends to produce most of its own tomato needs, it also plans to source a portion of its tomatoes from local growers. The IICEM should help Malisol to develop linkages with
the women’s groups in Tienfala who are currently, or have the potential to produce tomatoes.

**Market Study: The Fresh Market of Bamako**

There are three primary markets for fresh vegetables in Bamako; N’golonina, Medina and Woninda. Medina is the largest market and has the most diverse array of products. The N’golonina market is smaller, but with a focus on wholesale tomatoes. The N’golonina and Wonida markets are said to handle most all of the production from the Baguinéda zone. This makes sense, since the Medina market is on the opposite side of Bamako when approaching from Baguinéda.

In order to understand better these markets and make an estimate of the annual volume of tomatoes that pass through the Bamako markets, we interviewed a total of 5 key informants in the Medina, Woninda and Baguinéda market places. These key informants were wholesalers who had been trading in tomatoes for many years now; some prior to the closing of the Baguinéda factory. These informants permitted us to construct a generalized picture of market for fresh tomatoes in and around Bamako and to get a very rough estimate of the typical volumes handled in these markets and by individual wholesalers and in total.

**N’Golonina**

There are 30-32 vendors of tomatoes in the N’golonina market and there are 2-3 vendors that are considered full time in the market. We interviewed two of those vendors. Their names and phone numbers are found in the Resources section of this document.

According to these two informants, 30-32 vendors (they were able to cite them all by name) work this market and each will bring about 1 truck load of tomatoes per week. There are also 3 vendors that work more permanently in the market, and they will bring at least two truck loads per week. From this information, we determined that there are about 35 total truckloads per week that pass through this market during the high season for tomatoes; which extends from February through April. About 85% of the West African tomato production is said to occur during this high season¹…for which the exact range of dates may vary slightly by country and degrees latitude of production.

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¹ The exact range of dates may vary slightly by country and degrees latitude of production.
A truck load in Mali contains from 55-60 reed baskets (see photos below for image of the baskets). The estimated weight of one of the baskets is about 60 kg\(^1\) although we had been given estimates from 38kg up to 75kg. Indeed, there was little agreement on the actual weight of the baskets and people operating within this value chain did not seem care whether the baskets contained 10 to 15 kg more or less than the weight they presumed it to hold. Based on an average of the figures above and an actual weighing of one basket, we estimate that about 1840 MT of tomatoes are sold in the N’golonina market per year. This is about 65% of the total estimated production in Baguinédà of 2800 MT. We assume then that the remaining production of Baguinédà is sold directly from the Baguinédà market to buyers from other regions or from one of the other Bamako markets.

**Pricing**

Our informants told us that prices for a basket can range widely throughout the year; typically between 4000 and 15,000 CFA/basket. Our informants have told us, however; that they have seen the baskets sell as low as 1500 CFA and for as much as 50,000 CFA. Pricing

The seemingly average price is about 7000 CFA/basket. On the day of our visit to the N’golonina market, we found that the price was 6500 CFA. Interestingly, the day after this visit we went to the Baguinédà weekly market, just footsteps from the irrigated zone, and found that the baskets were selling for 2500 CFA/basket. It should be noted too, that the quantity of product in the market at this time was quite low. There were maybe six different producers attempting to sell in the market with no more than a total of 5 MT of product. By our estimates, there should have been about 185 tons of tomatoes harvested during this week in the Baguinédà Irrigated Zone. This gives a simple illustration of just how ‘saturated’ the markets are. If there was no demand for their products at this time of year and the tomatoes were ‘rotting in the fields’, we would expect to see many more sellers in the market with much more product than was actually present. As it is, we believe that the large majority of producers in the Irrigated Zone of Baguinédà had already sold their product to the wholesalers from Bamako during the week, and this had no need to go to the local Baguinédà market with their product. This confirms what our key informants were telling us concerning the Bamako market; i.e. that there is sufficient demand to

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\(^1\) These baskets are non-standard woven baskets. We have been given estimates of their weight full of tomatoes ranging from 38 – 80 kg. We weighed what seemed to be a relatively large and very full basket and found it contained 83Kg of tomatoes. We have selected as our average for these baskets as 60Kg. This figure is used throughout the study.
absorb all of the production in the Baguinéda Irrigated Zone and the other production zones of Mali throughout the year; i.e. that there is no lack of demand for tomatoes and wholesalers are never left with excess baskets in their possession.

**Market Dynamics**

Our informants seemed to be seasoned sellers and confirmed for us that they had been selling tomatoes in the N’golonina market for 7 years. Their supplies come primarily from Baguinéda, but they also get some supplies from Office Niger in Niono. According to one, money is exchanged separately from the exchange of the product. Her hired transport will go to Baguinéda in her absence and load tomatoes from her known buyers. She is given the tomatoes on credit from these farmers and will go to their village at a later date to repay that credit in person; usually within a week after the sale is made.

She will also obtain orders for tomatoes from her buyers, who will send young men with bicycles or push carts to the market to pick up the tomatoes. Some of her sales are made with cash advances and others pay after the receipt of the tomatoes. In any case, the credits on either side tend to last no longer than one week.

There is a considerable amount of trust built up between suppliers, wholesalers and the retailers. It is clear that without this trust and their developed network, they would incur much greater expenses and have to invest much more labor into their marketing and collection efforts. This explains, claimed one wholesaler, why farmers coming directly from Baguinéda with their product tend to have difficulty in selling just one or two baskets of tomatoes in this one-off scenario. It is not that the market is saturated. The problem is that these farmers have no developed network and may not even have the opportunity to meet many buyers in the market, since the product is typically exchanged by proxy and payments made at later dates. This may be one factor leading to the misperception by farmers that the markets are inundated with tomatoes.

Our informant seemed to say that she never has any trouble finding a market for her tomatoes. Indeed, the day that we were in the market, she had about 30+ baskets around her, which according to her, were pre-sold before they arrived to the market earlier that morning. She was just waiting for the owners to send someone to pick up their order. As evidence of this; when the occasional buyer passed by her stand, she would point to the only basket that was up for sale. Note that this was at, or very near the beginning, of the
heavy production season (19 March). This is when the markets are apparently ‘flooded’ with tomatoes.

From her testimony, it would seem that the fresh market is not totally saturated. In fact, the only constraint that she mentioned to selling in larger volumes was in finding available transport. She claims that sometimes she would like to buy more from the producers, but she will encounter a problem finding an available truck. Indeed, when asked what she needed to improve her operations, she said, “I need a truck”.

**Buyers**

Sales from the wholesalers are made mostly to women retailers in other markets and neighborhoods around the city. These buyers will buy usually take one basket at a time, sometimes 2 baskets, and sell throughout the week by the ‘pile’ (5-6 tomatoes laid out in small piles) or by kilogram. She also sells to some local restaurant owners. She claims also to sell retail to those that come to the market. She will sell from the N’Golonina market in quantities as small as 100 CFA if requested. Sales of this type, however; are relatively small for her.

**Medina Market**

We also interviewed two key informants from the Medina market. The information we obtained in these interviews corresponded very closely with that of the key informants from the N’Golonina market. The mode of operations for the wholesalers in the two markets is confirmed to be practically identical; with just a few differences.

The Medina market is much larger than the N’Golonina market. Table 1 shows the estimated annual volumes that pass through each of these markets and the general origin of the products.

<table>
<thead>
<tr>
<th>Market</th>
<th>Annual Volumes of Tomatoes (est.)</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medina</td>
<td>9500 MT</td>
<td>Niono (plus Sikasso and /Bouloudougou)</td>
</tr>
<tr>
<td>Medina</td>
<td>1000 MT</td>
<td>Burkina Faso</td>
</tr>
<tr>
<td>N’Golonina</td>
<td>1540 Mt</td>
<td>Baguinéda</td>
</tr>
<tr>
<td>Woninda</td>
<td>Less than ½ of N’Golonina</td>
<td>Mostly Baguinéda</td>
</tr>
</tbody>
</table>

Table 1. Market volumes in Bamako.

The women in the Medina market obtain the majority of their products from the Niono (Office Niger) region. Their sales are more consistent, however; throughout the year and they strive harder to maintain a consistent supply of tomatoes in the market by sourcing
from other regions in Mali, and even in Burkina Faso during the Malian rainy season, in order to supply the demands of the Medina market.

The traders in this market have a very close relationship with the growers in Niono, as did the traders in the N’golonina market with the growers in Baguinédé. They claim to regularly offer loans of inputs (seeds and fertilizers) to their growers and expect some form of exclusivity because of this. Cited as one constraint by these traders is the fact that growers sometimes sell to the first comers in the market rather than respecting the exclusivity that the traders had ‘paid for’ with these loans. They also claim that the farmers sometimes refuse to pay the loans for inputs and do not accept that the traders subtract these sums from their payments for fresh tomatoes. Essentially, the growers regularly default on their loans of inputs from the traders.

Another constraint cited by the traders in the Medina market is that they offer the tomatoes on credit to the certain retailers who may also default on these short term loans with them. They complain readily of this situation, but have continued in the business for 20 years using the same or similar practices, thus must therefore be deriving some reasonable benefit from their efforts despite these losses. Indeed, we were able to estimate, based on their own testimony, that their monthly net income is about 1,300,000 CFA.

The traders in the Medina market also cited available transport as a constraint. Surprisingly, none of the traders in either market cited available cash flow as a constraint. Each seemed to either have enough working capital or were able to take short-term credit with the growers as a way of meeting their desired sales levels.

### Reducing Losses

Although, the losses associated with the typical modes of transport of tomatoes in Mali are estimated to be as high as 40% from field to table, everyone along the value chain seemed blasé about losses and simply never mention it as a constraint. A simple observation of the full baskets, tells one that the tomatoes at the bottom of the basket are getting damaged from the mere weight of the tomatoes from above. Furthermore, while conducting this interview, we were able to observe several instances where young boys damaged tomatoes during the process of loading the baskets onto their pushcarts. They would place one basket in the available space and then force the second one in so it would sit flat on the platform of the cart. When the second basket was pushed in, there was a visible flow of tomato juice spurting from the sides of the first basket. Not one raised an eyebrow at this.
Clearly some form of advantage could be had by stemming the loss associated with transport and post harvest packaging. This would most likely involve considerable investment, however; in standardized, stackable plastic crates. The IICEM project could seek a method of introducing this type of packaging, but this possibility is put forth with severe skepticism of its likely success.

In theory, introducing some a form of improved post-harvest packaging would considerably decrease losses of product and could extend the post harvest life time of the tomatoes by 2-3 days. The introduction of such an innovation, however; may also have many unforeseen knock-on effects; such as creating a need to retool the way the product is transported from the wholesalers to the retailers or even taking jobs away from the pairs of young boys who earn their wages by lifting the baskets from their current resting place to the trucks or bicycles that carry them on to their next destination.

The baskets made of woven palm fronds cost 500-700 CFA/each. This translates into about 10 CFA/kg transported. If we estimated that there are 35 truckloads of 50 baskets coming into this market weekly and that a full complement of two sets of baskets (one to hold current product and one to hold product being harvested in the field or to account for baskets in the process of being returned from the end consumer) are required to service the market, then we estimate that the N’golonina market needs about 4000 baskets during peak operation. The cost of this number of baskets is 2 million CFA over the supposed 2 to 3-year lifespan of the baskets.

If the IICEM were to introduce a change to this system by promoting the use of the types of plastic crates now employed in Mali for mangoes, considerable investment would be required. These crates cost $12/ea and can hold about 12 Kg of tomatoes. That is about 400 CFA/kg of product transported; or 40 times the cost of the local baskets. About 17,000 baskets would be required to supply the entire N’golonina at a cost of about $203,000 or 81 million CFA. Estimating that these baskets would have a lifetime of at least double that of the palm reed baskets, this would represent a supplemental investment of 77 million CFA (81 million minus 2 X 2 million CFA).

If we look at the savings obtained from using these baskets, we can get some insight of the cost vs. benefit. If indeed the savings in losses could be reduced from 25%\textsuperscript{1} to just 5% there would be a savings of 20% of the product sold via the N’golonina market. Taking the average price of tomatoes at 140 CFA/kg ($0.35/kg), this would represent a savings of 43 million CFA/year; or a 3 Year ROI of 167%. Over the estimated 6-year lifetime of the crates there would be a total savings of $258 million CFA.

It is also possible that there are some additional savings associated with being able to transport more products in the same vehicles (to be verified). There may also be an extension of the post-harvest lifetime of the tomatoes that are sold on the market, since they will be less subject to crushing and will be cooler and more aerated. On the other hand, there may be some additional costs associated with maintaining control of all the...
baskets and additional handling. The plastic crates have multiple uses and are more likely to be the subject of theft and pilfering than the palm reed baskets.

Note that currently a bicycle or a push cart can transport two traditional baskets at a time. To do the same work, the bicycle would have to transport about 8 plastic crates at a time. This pushes the limits of the bicycles, as do the reed baskets, but the bicycles may also have to be slightly reconfigured to go from reed baskets to plastic crates. In all, there will be multiple challenges in introducing these baskets to the market place, but the potential ROI is also quite good.

Supply Side Interventions

It was not an objective of this study to look at production, but there are a few things on that subject worthy of mention.

TMV

The IICEM project is working hard to reduce the negative effects of the TMV (tobacco mosaic virus) on production in the Irrigated Zone. Their approach is to establish a host-free period during the months of May to July and then begin anew the next season with uniquely TMV resistance planting material. This is expected to have a positive effect on production. With the presumed increases production that this effort will likely bring, we can expect that prices for product could fall commensurately; further accentuating the need for value added processing in Baguinéda. Even though prices may be pressed lower due to increased production, the farmers are still likely to make more money overall.

Extending Seasons

Another way that farmers can get more value from their labors in tomato production is to extend the productive season and to effectively spread out the harvest periods over a longer time range. Technically, this may be possible to a certain degree with staggered planting dates and the introduction of indeterminate varieties, if indeed there are locally-adapted indeterminate varieties available. There are, however; climatic limits and farmer’s labor constraints that will diminish the potential success these possibilities.

Currently, the bulk of the tomato production begins around the end of December and extends through April. Farmers most likely have very little time during the latter months of fall (September – November), due to activities surrounding the rice harvests. If this were not the case, this period would be an excellent time during which to produce tomatoes, since the prices are quite high during these months. Also extending production into the months of May-July is probably limited by climatic conditions; heat and/or heavy rainfall; depending on the month.
It is not easy to know how far one can push the climatic and cultural limits that result in serious drops in production from May-December. The IICEM may want to run some demonstrations to test this. A thorough review of existing literature, however, may also reveal some past experience with this sort of investigation.

**Tomato Paste Production (Industrial)**

**SOMACO**

The SOMACO tomato paste factory was constructed in Baguinéda in the year 1964. This was a para-statal industry that survived until 1998, when it was completely shut down. The factory produced primarily double concentrated tomato paste (28% MC), but also delved into the production of juice packets (ala Capri Sun). This factory absorbed the vast majority of the tomatoes produced on the parcels of Baguinéda.

The exact history if the factory was not fully investigated. The most important fact today is that the factory is closed and gutted. There is only the shell of a building left behind and some parts of the boiler equipment remaining.

The legacy of tomato production in this zone, however, did not completely disappear with the closing of SOMCO. There are many farmers who still produce tomatoes in the Baguinéda irrigated zone during the *contre saison* (dry season after rice harvest, typically considered to be from December until May). These tomatoes are now used to supply the fresh tomato market in Bamako and its surroundings.

At the time that SOMACO was in full operation, it was said that the growers of Baguinéda obtained a yield of 40MT/Ha. Today the yields are nearer to 20MT/Ha. It would seem that production has dropped off as a function of the decreased demand due to the closing of the factory. Indeed, 20MT/Ha is rather low for most industrial production settings. With proper varietal selection, irrigation and fertilization most industrial tomato plantations now obtain between 90-120 MT/Ha. It is thought that this yield level is quite possible in Baguinéda during at least one of the two tomato production seasons. It may well be that this yield could be had twice per year in Baguinéda with some investments in drip irrigation and a greater attention the details of commercial tomato production. Clearly, these kinds of investments are not being made by the cash-poor and risk-averse farmers of Baguinéda at this time due to the highly speculative nature of the fresh tomato market in Mali.
The closing of SOMACO has severely hurt the revenues of the farmer in Baguinéda. At the time that the factory was operating, the farmers had a regular and assured market for their produce. Now farmers are growing only for the fresh market, which is not an assured market and for which the prices are always fluctuating. One thing to keep in mind, however; is that the factory rarely paid more for tomatoes than the lowest price that farmers can get on the fresh market and this will remain true if the factory were to re-open. This means that if the fresh market still has demand, that most of the production in Baguinéda will be sold as fresh. Any factory, past or present, will depend on the fact that the local fresh market for tomatoes is satisfied before they can have a guaranteed source of raw materials. In most countries, industrial tomatoes are of different varieties than table tomatoes, but in Mali it seems that the fresh market will take tomatoes of all varieties, even those that are considered processing tomatoes.

Below is a summary of prices found in the fresh markets and for those that are typical of industrial processing.

### Some Indicative Tomato Prices

<table>
<thead>
<tr>
<th>Product</th>
<th>CFA/Basket (~60Kg)</th>
<th>CFA/Kg</th>
<th>$/Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket in Bamako Fresh Market (Maximum ever noted)</td>
<td>50,000</td>
<td>833</td>
<td>2.08</td>
</tr>
<tr>
<td>Basket in Bamako Fresh (Normal seasonal high)</td>
<td>15,000</td>
<td>250</td>
<td>0.63</td>
</tr>
<tr>
<td>Basket in Bamako Fresh (Average seasonal price)</td>
<td>6500</td>
<td>108</td>
<td>0.27</td>
</tr>
<tr>
<td>Basket at farm gate (Normal seasonal low)</td>
<td>2500</td>
<td>42</td>
<td>0.10</td>
</tr>
<tr>
<td>Average US price for processing tomatoes in the field (2006)</td>
<td>1440</td>
<td>24</td>
<td>0.06</td>
</tr>
<tr>
<td>Last known price at SOMACO factory door (before 1998)</td>
<td>1500</td>
<td>25</td>
<td>0.63</td>
</tr>
<tr>
<td>Farm gate price sought by Turkish tomato processors in 2008.</td>
<td>&lt;1200</td>
<td>&lt;20</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

*Table 2. Indicative tomato prices.*

Prices for field tomatoes around the world are quite low; even by Malian standards. The fresh market will always pay more for tomatoes than any processing facility. Prices that any factory in Mali would likely pay are lower than the current lowest prices the Baguinéda farmers can get in the fresh market. Therefore, although the re-opening of the factory is likely to be one of the best things for the Malian growers in Baguinéda, it will not be because they will obtain more money per kilo for their tomatoes. In fact, the growers in Baguinéda are very likely to get less per kilo with the factory in place. The advantage of the factory for the Malian growers would be in terms of an offering an assured and continuous market for their product, thereby allowing them to better estimate
their costs, make additional investments in terms of seed, inputs and labor and also spend less time negotiating with traders.

These advantages may seem rather esoteric to the growers in Baguinéda, especially when there is a rather large fresh market available to them. It is possible that the relationship between the factory and the growers could meet the same fate as those of the Northern Star Tomato processing facility in Ghana (See Annex B). The factory offered seeds and fertilizer to some growers and had expected in return to get a guaranteed supply of tomatoes throughout their processing season of 5 months. The growers, however; whose expectations were not in line with that of industrial tomato growers around the world remarked that the fresh market was offering better prices and they began selling their production to the fresh market.

The reality is that the fresh tomato market and the industrial tomato market are two completely different things. Farmers cannot expect a factory to pay anywhere near the prices that they could get in the fresh market. They must also understand that factory prices can fluctuate throughout the year and from season to season due to global market pressures. The factory management, on the other hand, must learn to set consistent and transparent pricing policies that allow them to gain the confidence of the farmers. There is not one formula for this, and the strategies to keep farmers motivated will vary from country to country and factory to factory. Typically factories will announce a minimum price at which they will buy any and all production coming from a circumscribed area. The factory is expected to adhere to this minimum price, even if the world market situation forces their margins towards zero. It is critical that they maintain the trust of the farmers for the next season. Also, should the prices of finished product be on the rise, the factor is expected to increase the price at which they buy tomatoes from their farmers...keeping a relatively steady profit margin at all times. Once this trust breaks down it can spell disaster for the company and ultimately the farmers that supply this company.

One way to assure that the factory will always have a steady supply of product is to assure first that the production levels in the area where they operate is more than adequate to supply the fresh market. Usually, however; table tomatoes and field tomatoes are not the same variety, and any factory can project its raw material supply by maintaining close contact with farmers at the time of planting to see that their farmers are indeed planting processing tomatoes.

This issue, however; will most likely be extremely important to any factory that would operate in Baguinéda. Is the fresh market adequately supplied? At this time it appears yes; but not to excess. Prices in the fresh market do drop during several weeks throughout the year, but this study did not reveal that there is a huge excess in production or that there are large quantities of “tomatoes going rotten in the field”. This should give pause to any prospective operators of a tomato paste factory in Baguinéda.

The normal capacities of competitive tomato paste factories are enormous compared to the current local production. Some of the smallest factories operate at 5 MT/h. Factories
typically operate 24 h/day and must have a steady season of, at the very least, 100 days [Although 5 months is a typical target season for factories to get a decent return on their investment].

In order for a 5 MT/h factory function in Baguinéda; a minimum of 12,000 MT/yr of processing tomatoes would have to be produced in this zone. Currently the production is estimated at 2800 MT, which is just a quarter of that needed to adequately supply the smallest of processing facilities. With just 95 ha now planted to tomatoes in Baguinéda, yields would have to triple to 60 MT/Ha in order to supply have of the factory’s needs.

Clearly at current production levels within Mali, any factory that opened tomorrow would be in direct competition with the fresh market and could easily suffer a similar fate of the Northern Star Tomato Paste Factory in Ghana unless substantial efforts were made to increase yields and increase the current surface area under cultivation.

**La société nouvelle SOCAM S.A**

During this study, we were able to identify a group of investors; led by Mamadou Sinsy Coulibaly, which is already pursuing the implantation of a new tomato plant facility. It appears that their proposal has been stalled at the ministerial level during the approval process. The reasons for this are not clear.

They have developed a business plan for this project, which also calls for the production of mango paste using essentially the same equipment used in tomato sauce production. The parameters mentioned in the document seem relatively correct and the plan is quite well thought out. Assuming that production could be brought to adequate levels on Baguinéda to supply a tomato paste factory, this project may meet with relative success.

Energy costs will be the next biggest issue for this proposed factory to deal with. It is not clear in their business plan that they have taken energy costs into account. This is despite the fact that it can comprise 9-10% of the total cost of production [Annex C].

This project is clearly distinguished from an investment in artisanal sauce production by the level of investment required. The equipment costs alone are estimated at $3 million dollars. This excludes the IICEM from effectively helping this project financially. Given, however; that it is the goal of the IICEM project to assist the producers in the Baguinéda Irrigated Zone to find a solution to add value to their current production and increase their revenues, it is recommended that the IICEM do whatever is permitted within their mandate to promote this new facility by this group of investors. This should include weighing in at the ministerial level concerning the approval of the project.
Tomato Paste/Sauce Production (Intermediate Level)

During the course of this study, an existing artisanal producer of tomato sauce was identified. He is the President of *Federation National des Transformateurs des Produits Agroalimentaires du Mali* (FENATRA). Yaya Malle, owns and operates an artisanal tomato paste production facility. Mr. Malle has a simple operation that he runs out of a small workshop in his family’s compound. He produces tomato sauce, but also produces fruit juice concentrate. All of his products are sold under the brand name NAKO. His process is quite simple in that he pulps his tomatoes and then jars the product prior to pasteurization.

Mr. Malle’s production process consists of:

- **Slicing Tomatoes**
  - (By hand into slices)

- **Cooking**
  - (salt added)

- **Filtering Pulp**
  - (hand-spun centrifuge)

- **Bottling**
  - (500g jars w/ lids recovered from market at 100 CFA/ea.)

- **Pasteurization**

- **Labeling**

- **Delivery to Market**

![Flowchart](image)

*Fig. 5. Process for tomato sauce production. NAKO.*

The yield of product is 700g from 1Kg of fresh tomatoes. Given most tomato sauces are produced at a raw tomato/product ration of 2 to 1, Mr. Malle is clearly selling a very liquid tomato sauce.
Mr. Malle also produces on a very small scale. He processes 5 tons of tomatoes per year, which translates into a production of about 7000 jars per year. He only processes tomatoes during the heavy production season in Mali, from mid-February through mid-April, when the prices for the raw material are low.

He claims that people like his product and that it sells well. His only market is the three upscale supermarkets of Bamako; Fourmis, Azar (Hippodrome) and Azar (Badala). He can sell up to 80 jars per week to each of the supermarket, but claims to average about 200 jars per month to all three local upscale supermarkets. The demand for this product varies as a function of the availability of fresh tomatoes. His sales go up during the months of May to August, when the availability of fresh tomatoes goes down and their price has gone up. Essentially this product serves as an alternative to fresh tomatoes when the price of fresh tomatoes is at its peak.

**Pricing**

Mr. Malle can pay up to $0.40/kg for his raw tomatoes and probably as little as $0.25/kg. He sells his product for 700 CFA, delivered. The retail price we found in the market for his product was 825 CFA. Unfortunately, Mr. Malle does not track his other expenses, such as; labor, propane gas or transport so it will be difficult to estimate his profit margins. We can say, however; that his raw material constitutes somewhere between 5% and 10% of the cost of his final product. Packaging constitutes about 15% of the total cost of his product. In fact, it would seem that Mr. Malle has excellent margins on his product; provided his energy costs are not too excessive.

Mr. Malle believes that people buy his product over the tomato paste, because it is more like fresh and sweeter, i.e. not as acid. He thus postulates that those with more disposable income are prepared to pay extra for his sauce. Indeed, he does not compete with tomato paste on price, since the same supermarkets are selling 400g of double concentrated paste for 425 CFA; just an arms length from his product.

**Other Markets**

Mr. Malle has explored the possibility of getting his product into the more mainstream local Malian markets. He has encountered problems, and has yet to make significant sales in these venues. There are several reasons for this cited by Mr. Malle himself:

1. **Price.** Mr Malles’ tomato sauce sells wholesale for 700 CFA/500g, whereas a double concentrate tomato paste sells for 425 F CFA/400g.
2. **Perception.** There is a clear perception that the NAKO sauce does not yield the same amount of tomato product as the concentrated paste. Indeed it does not. A paste is usually a 6:1 reduction whereas his sauce is not even a 2:1 reduction.
3. **Packaging.** The local vendors do not like to stack glass jars in the open air markets for fear of breakage.
It is possible to imagine that citizens from the region of Baguinéda, possibly the growers themselves, could replicate the efforts of Mr. Malle. There is even the possibility of scaling up slightly his operation using imported intermediate scale equipment. A pro forma for such equipment is given in Annex C. This is a slightly dated pro forma, but it gives an indication of the investments needed to enter the market at this level. The total cost of the equipment shown is about $26,000. It would be easy to argue that certain items in this list could be eliminated for a more manual approach, but the cost of this equipment is not the primary point to be considered. In any tomato processing operation that is going to involve pasteurization and/or a concentration of product, energy cost is the major factor to take into consideration.

Unfortunately Mr. Malle has never estimated his energy costs per unit of production. Certainly with the margins he is able to make over his raw material costs, he is probably not losing money in his venture. The problem is that he operates in a very small niche market, for which there remains little room for expansion. Therefore, the artisanal production of a tomato sauce product for the producers in Baguinéda is not considered a viable option for adding value to their relatively large volume of tomato production.

**Dehydrated Tomatoes**

Dehydrated tomatoes are typically a product sold to larger industries as a secondary commodity, i.e. as ingredients for other finished products such as dried soup mixes. A dehydrated tomato is distinguished by its moisture content and is distinctly different than sun dried tomatoes. A dehydrated tomato will have <5% moisture content, whereas sun dried tomatoes have between 15% and 18% moisture content. All dehydrated tomatoes made for industrial purposes are dried in ovens. It is almost impossible to dry to that level in the sun, since removing the final few percentage points of moisture require a very significant temperature and humidity gradient between the center of the product and the surface of the product. Most industrial dehydrated tomatoes are dried in ovens at 60°C – 70°C for about 6-8 hours. This is a very energy intensive process.

**Les Coquilles**

The French NGO, TANIMA 2000, has a project that promotes solar drying of tomatoes and onions amongst groups of women. They use a shell-style dryer [coquille] that is made of metal and covers the product from the sun during the drying process. They insist that because the product is not exposed to the direct UV rays of the sun, that more vitamins are preserved in the product. Their goal is improved nutrition at the household level, but they do sell some surplus product at 300 CFA/100g. Their product is more similar to a dehydrated tomato than to a sun-dried tomato and is certainly shelf-stable. The exact moisture content of the product was not known, but it is presumed to approach 5%.
The annual production of the TANIMA 2000 project is a mere 200kg; and this is with 1000+ women operators. This is not a level of production that will make a difference for our producers in the Baguinéda region. A quick calculation, however; does show the potential of this methodology if it were employed to on an even large scale.

The cost of the dryer is 15,000 CFA and each one has the capacity to dry 8Kg of fresh tomatoes per 24 hour period. The conversion is 20Kg of fresh tomatoes to make 1 Kg of dehydrated tomatoes. This permits each dryer to dry 400g of product every day. If one were to attempt to dry, over a 5 month period, all of the 2800 MT produced in Baguinéda, it would require the purchase of 2333 ‘coquilles’ at a cost of 35 million CFA or just under 100K.

This is a considerably smaller investment than one would incur for an industrial sized oven that would accomplish a very similar result. Also, there are no energy costs involved. The issues are quality control amongst 2333 different ‘factories’ and the significant labor and surface area requirements.

We feel that this remains a one-off venture and does not represent a viable alternative for tomato processing in the Baguinéda area. The primary issue is that the product that they are currently producing is a dehydrated tomato. Dehydrated tomatoes are principally used as industrial ingredients and must meet very high standards of quality and production. Even if the product was to meet the quality control standards required by the buyers, there would be no way to assure the buyers that tight controls over production are maintained on a consistent basis due to the large number of individual producers involved.

Malisol

Malisol is another company that will attempt to produce dehydrated tomatoes in the Bamako region. We had a chance to visit their proposed facility in its start up phases. This factory and production zone is a joint venture between Dr. S.Y. Touré of Promotelf, two Dutch-owned companies; Hellenraad B.V. and Rossen Seeds B.V and a Niger-based seed company; Ferme Semencière Aïnoma. Their farm is located about 25km from Bamako on the Kolikoro Road. They have an 8 Ha growing area and a production hall that is approximately 350m2.

They will use a drip irrigation system for their production and plan to produce tomatoes continuously throughout the year. Their conservative estimate of their annual production per hectare is 90MT, but they expect to have much more than that using the rotational planting system they envision.

They claim to be targeting the production of dehydrated tomatoes and claim to have a European buyer already lined up. This product would normally have a moisture content of less than 5%. In their project documents, however; the mention that 10kg of fresh tomatoes are required to produce 1kg of dried tomatoes. This is obviously an error, as the standard product requires at least 22kg of raw material for 1kg of finished product. They
also base their estimated revenues on this same calculation. This note in their technical document raises some questions about their potential profitability. Their yield of finished product, and thus their total revenues, may be effectively halved when this error is corrected.

![Variables](image)

<table>
<thead>
<tr>
<th>Target Moisture Content of FP</th>
<th>Kg Raw Material Required for 100kg FP w/ 30% processing loss</th>
<th>Ratio RM:FP</th>
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<td>5%</td>
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</tr>
</tbody>
</table>

*Fig. 6.* Raw materials required for drying tomatoes to varying moisture contents. *Note the original moisture content of the tomato may vary changing the equation.*

We were unfortunately not able to meet with the technical coordinator of the factory during this visit so we cannot really effectively comment on the proposed production process. What were able to learn, however; that they intend to use a resistance heater supplied with electricity from the local grid as a heat source. One should be very skeptical of the potential success of a dehydration facility that intends to use electricity as their energy source for such an energy intensive process; especially so in a country where the cost per kilowatt-hour is relatively high. Most dehydration facilities use steam generated from a boiler to supply heat to an exchanger with the drying ovens.

Mali’s cost per industrial KWh is one of the highest in the world, at an average of $0.160/KWh\(^2\) [Annex C]. Of the countries listed in a bulletin from the US Energy Information Administration, only one other country, Cyprus, has a higher industrial energy cost at $0.167/KWh\(^2\).

\(^2\) Averaged over a 24 hour period [See Annex 2 for a breakdown of the costs during different times of the day]
Should this project somehow be successful, the IICEM could possibly promote the growers of Baguinéda as potential suppliers of raw material to this facility. The two are not very far apart as the crow flies and there is the possibility of transporting the tomatoes by barge across the Niger River at a reasonable cost.

**Sun-dried Tomatoes**

Sun dried tomatoes represent a potentially viable option for value added processing of tomatoes in Mali. Sun dried tomato production is a relatively low-tech operation. To the casual observer, the process would seem fraught with risk of biological contamination since the process is conducted in the open air. It is a product that carries some risk of contamination, but with rigorous post-processing monitoring and testing, assurances can be made to its safety as a food product.

The process consists of harvesting tomatoes and taking them directly to the field. Ideally there is an outdoor washing station in the field. The tomatoes should be soaked for several minutes in a chlorine bleach solution or another disinfectant.

![Fig. 7. Sun dried tomato production in Turkey.](image)

The tomatoes are then rinsed in clean water and carried to the drying station as seen in fig. 7. The drying station can be as simple as Polypropylene (rice sac) material. The material is ideal because it is clean, disposable and aerated due to its woven pattern. This product is available in Mali from Embalmali. The cost of the material was quoted at 132 F CFA/m². This material is tacked into the ground and overlapped to create a large continuous surface.

The tomatoes are brought from the washing station to the drying area, cut in half and laid in the sun with the pulp side up. At this time, either salt (NaCl) or sodium bi-sulfide are spread over the tomatoes as evenly as possible using some form of manually operated dispersion device. The tomatoes will dry usually during a three day period. The tomatoes are dried to a moisture content of between 15%-18%, which is notable higher in moisture content that the tomatoes produced by TANIMA 2000. This process requires about 15Kg fresh tomatoes to make 1 Kg of sun dried tomatoes.

The indicative FOB Senegal price for bulk-packed (5Kg plastic bags in a box) sun dried is about $3.40/Kg. With this price it becomes clear that this process would require the farmers to produce tomatoes at very low costs and that their farm gate price would be comparable to that of tomatoes destined for a tomato paste factory. The advantage to the
Baguinéda farmers would be that if they were able to organize themselves, they could do the ‘processing’ as a group with very little investments. As they become more skilled in the processing and knowledgeable about the market, they could possibly add value by packaging in retail packets (fig. 8).

Below is a SWOT analysis of this potential activity. The major risk comes from contamination due to dust. In Turkey the major risk is a poorly-timed rain during the drying season. There is much less risk of that in Mali, but a much greater risk that the desert sands will kick up during one of these days and dump a lot of organic and inorganic material on the drying tomatoes. Because of this fact alone, this method of adding value to Malian tomatoes is proposed with much hesitation. On the final day of the consultants’ visit, March 29 there was quite a large dust storm that could have potentially ruined any tomatoes that were drying the open at that time. This is seen as the primary risk of this processing option.

<table>
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<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tr>
<td>❖ Existing production zone</td>
<td>❖ Marketing</td>
</tr>
<tr>
<td>❖ Malian Sun/Aridity</td>
<td>❖ Experience with export</td>
</tr>
<tr>
<td>❖ Unbroken dry season (relatively)</td>
<td>❖ Lack of Mali track record for this product</td>
</tr>
<tr>
<td>❖ Existing Micro-biology lab</td>
<td>❖ Mali/Africa lack of reputation in food export</td>
</tr>
<tr>
<td>❖ Locally Available Polypropylene</td>
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</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Low-cost investment</td>
<td>❖ Dust</td>
</tr>
<tr>
<td>❖ Investment is scalable to production</td>
<td>❖ Microbial infection</td>
</tr>
<tr>
<td>❖ AGOA = 12% tariff goes to 0%</td>
<td>❖ Poor QC</td>
</tr>
<tr>
<td>❖ Could impact Baguineda farmers in a real and positive way due to high volumes</td>
<td>❖ Inability to find markets</td>
</tr>
<tr>
<td>❖ GDA’s – Letters of Intent to Buy</td>
<td>❖ Customs issues on export</td>
</tr>
</tbody>
</table>

Fig. 8. SWOT analysis sun dried tomatoes in Mali.
There is a 12.5% tariff on imported sun dried tomatoes from most countries, however; the AGOA trade act should make Mali and other African countries exempt from this tariff. This fact offers quite a good competitive advantage to competing with imports from other countries. And, given the high labor cost associated with production in the US, Mali may have a chance to be competitive with their products as well.
Conclusions

Based on the terms of reference for this study, the consultant was to examine the possibility of creating an artisanal manufacturing process for tomato paste/sauce in the environs of Bamako, Mali as a means to add value to the tomatoes produced in the Baguinéda Irrigated Zone. The conclusion from that aspect of the study is that such a facility is within the realm of possibility to create and in fact one such facility already exists in Bamako. But, due to the limited market that such a tomato sauce product has, duplicating or enlarging the capacity to produce such a tomato sauce would do little to change the situation for the growers in Baguinéda.

Prior to this study, there was supposed to be a successful example of small scale tomato paste processing in Ghana. After tracing this information back to its source; presumed to be Dr. Issoufou of the AVRDC (see Key Informants) it was determined that this was actually in reference to the Northern Star Tomato plant, which is an industrial-scale facility.

Of the other options for value added processing examined, sun dried tomato production represents some degree of potential. This is a low capital investment project with a highly labor-intensive process, thus ideally suited for a developing country scenario. One of the main disadvantages is that this is a purely export market and Mali has neither history of supplying this market, nor any established links with buyers. Also, there is a great risk of biological contamination via airborne particles.

Amongst the other options for value added processing examined, it appears that the best possibility is the re-establishment of an industrial scale tomato paste factory. Anything less than industrial scale would not be competitive with imported tomato pastes. The tomato paste processing industry is very well developed around the world. The USA, Spain, Italy, Turkey and most recently China are all strong competitors in this marketplace. Industrial tomato paste processing has undergone technological advances and has been the subject of multiple increases in efficiency. This applies both to the production of tomatoes and the processing. A look at the following chart reveals that since the real price (inflation adjusted) of tomato paste has been reduced to 25% of its price in 1965. Much of this is due to decreased margins, but it can also be attributed to increased efficiencies in the industry. The real farm gate price tomatoes have also dropped as has the cost of processing. Only transport has remained almost steady in real price terms.
These increases in efficiencies have continually caused tomato paste processors to go out of business when they have not upgraded their production processes or continually assured themselves that they are getting the best-priced raw material supply. According to data collected by the Morningstar Tomato Packing Company, there is a cycle that repeats itself every five years, where multiple tomato processing facilities around the world close due to the evolution of the industry. They have tracked the data and can demonstrate clearly that this cycle exists. Coincidentally, one of those years where the downturn occurred coincides approximately with the closure of SOMACO in 1998-99. Since 1965 margins have been severely reduced due to continually increasing competition in the sector.

Thus, the tomato paste processing industry is very competitive and carries great risk to new entries in the marketplace. A Malian based company would, however; have certain advantages. First of all, any facility in Mali should only target the domestic market. The primary advantage of a Malian facility is that its transport costs are greatly reduced compared to other exporters that must get their product to this land-locked country. Secondly, there is a strong local demand for the product. It is widely consumed as a staple sauce ingredient in most households in Mali. There is a relatively strong production base in Baguinéda, but these producers will also have to improve and eventually approach the international yield levels. Also, should the Malian government decide to protect this industry, it could easily do so with a modest import tariff and quota on any level of imports that go beyond the total domestic demand minus that produced by the Malian facility.
Finally, there is enormous potential to reduce post harvest losses with improved post harvest transport containers. However; if the introduction of improved containers emanates from the outside and without consumer demand, there is a great likelihood that this effort will not meet with the anticipated success.

**Recommendations**

The IICEM should focus on assisting the potential investors in the new SOCAM to obtain approval for their project on favorable terms, i.e. a reduction in the heavy taxes assessed on profits in Mali.

IICEM should use its skills to assist Malisol to meet its off-farm tomato production quota using the womens groups in Tienfala. There is tremendous potential for an transfer of technology and techniques from the intensive production area of Malisol the facility and the growers in Tienfala.

If deemed appropriate, the IICEM should also test the production of sun dried tomatoes. The production of about 1000 kg of finished product is more than enough. This trial would permit the testing of the finished product against the norms cited in Annex E for sun dried tomatoes and would also provide samples with which to solicit buy orders from overseas buyers.
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Annex A

Tomato Farmers Sting Management

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Published on: 3/27/2008 10:13:13 AM

TOMATO FARMERS in the Upper East Region have blamed the management of the Northern Star Tomatoes Factory for the closure of the factory.

They maintained that the closure was the result of the factory’s management’s refusal to reciprocate the confidence, trust and transparent ways the farmers had dealt with them since last year.

According to them, the factory, since its inception last year, had not been fair in its dealings with them, so they also lost confidence and trust its management.

The farmers raised these issues at a press briefing in Bolgatanga to tell their side of the story regarding the current state of the Northern Star Tomatoes Factory.

In their view, the crisis in which the factory currently finds itself is self-inflicted, as the factory initially enjoyed the support and co-operation of the farmers until management started playing tricks with and cheating them.

Market women popularly referred to as Tomato Queens, currently buy the big size crate of tomatoes at prices ranging from GH₵35.00 to GH₵40.00, but the farmers say they were prepared to sell that same crate of tomatoes to the factory at GH₵15.00; an offer which the factory’s management had refused, they claimed.

A statement read at the press briefing noted that farmers preferred selling their produce to the factory even at a reduced price just to ensure that the factory was sustained to create jobs for the youth and farmers in the region, but the uncompromising stance of the factory’s management had compelled them to continue selling the tomatoes to the Tomato Queens, most of whom came from Accra, Sunyani and Kumasi.

According to the statement, the farmers desired to see the factory operate at its full capacity, because by this way, their produce would always get ready market and they would also be enable to pay back their loans; but the attitude and price policy of the factory’s management was deterring them from giving out their produce.

The struggle and misunderstanding between the farmers and the tomato factory was over unacceptably low price from the factory, compared to the price by the Tomato Queens, delay in paying for last year’s produce which was bought on credit, cumbersome buying process by the factory and cruel treatment.

These and others, the farmers contended, had led to the untimely death of some of their colleagues who took loans but could not pay back.
The statement said the factory had insisted on paying GH₵11.40 for a crate of tomatoes that the market women were buying at GH₵35.00, despite the farmers’ appeal to the factory to buy it at GH₵15.00 to enable them to meet production cost.

The farmers denied ever receiving farm inputs from the factory as being portrayed by sections of the media, adding that though the factory promised to supply them with the inputs, it never materialized, except a few farmers who received tomato seeds from the factory.

They recounted a situation last year where so many farmers abandoned their traditional crops and went for loans to cultivate tomatoes to sell to the factory, upon hearing that the then Minister of Trade, Industry, Private Sector Development and PSI, Alan Kyeremanteng, had promised that the factory would buy all tomatoes from the region to keep farmers in business.

The factory started paying GH₵15.00 for a crate of tomatoes but reduced it to GH₵12.00 then to GH₵8.00 and finally to GH₵6.00, which the local farmers revolted against; a development which initiated the impasse.

As a way out of the misunderstanding, the farmers suggested that the factory’s management should work hard to rebuild farmers’ confidence and trust in the factory’s dealings with them.

They also called for support in the form of inputs to reduce their cost of production.

From Eric Bawah, Bolgatanga

Source Link: www.modernghana.com
Annex B

2.3 Environnement fiscal

Les entreprises maliennes sont soumises aux impôts et taxes suivants.

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<th>Désignation</th>
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</tr>
<tr>
<td>Contribution des patentes</td>
<td>Droit fixe + Droit proportionnel</td>
<td>Droit fixe dépend de la zone et de la classe, Droit proportionnel = 10% de la valeur vénale</td>
</tr>
<tr>
<td>Contribution forfaitaire</td>
<td>5,5%</td>
<td>Masse salariale</td>
</tr>
<tr>
<td>Taxe d'apprentissage</td>
<td>2%</td>
<td>Masse salariale</td>
</tr>
<tr>
<td>Taxe de logement</td>
<td>1%</td>
<td>Masse salariale</td>
</tr>
</tbody>
</table>

2.4 Environnement juridique

Le Mali a mis en place un cadre juridique national qui règle les litiges soit à l’amiable, soit au niveau des tribunaux de commerce.

En plus, il est membre de l’Organisation pour l’Harmonisation du Droit des Affaires en Afrique (OHADA) et de l’Organisation Mondiale du Commerce (OMC) et applique leurs principes.

Le Mali a également ratifié la convention du 18 mars 1965 créant le Centre International pour le Règlement des Différends relatifs aux Investissements entre États et Ressortissants d’autres États (CIRDI).

2.5 Les facteurs de production

Le terrain
Le prix du terrain varie selon la localité, la zone et la nature de l’acquisition.

Les constructions
Le coût des constructions est fonction du type de construction. Il dépend en grande partie du coût des matériaux de construction très fluctuant.

Salaire minimum interprofessionnel garanti
Le Salaire minimum interprofessionnel garanti est actuellement 28 460 F CFA / mois.

L’Énergie et l’eau
Les tarifs de l’eau et de l’électricité sont les suivants :

<table>
<thead>
<tr>
<th>Désignation</th>
<th>Coût</th>
</tr>
</thead>
<tbody>
<tr>
<td>Électricité (tarifs industriels)</td>
<td>98 F CFA / Kwh</td>
</tr>
<tr>
<td>- Heure de pointe (18-0 heures)</td>
<td>88 F CFA / Kwh</td>
</tr>
<tr>
<td>- Heure pleine (6-18 heures)</td>
<td>63 F CFA / Kwh</td>
</tr>
<tr>
<td>- Heure creuse (0-6 heures)</td>
<td>43 F CFA / Kwh</td>
</tr>
<tr>
<td>Prime fixe mensuelle</td>
<td>1246,56 F CFA / mois</td>
</tr>
<tr>
<td>Eau (industrie et gros clients)</td>
<td>311 F CFA / m³</td>
</tr>
<tr>
<td>Tranche unique</td>
<td>323 F CFA / m³</td>
</tr>
</tbody>
</table>
### Annex C

**Subject: Complete plant for processing Tomato Ketchup/Sauce.**

Capacity: 2 tones per day.

<table>
<thead>
<tr>
<th>QTY</th>
<th>PARTICULARS</th>
<th>RATE USD</th>
<th>PER</th>
<th>RS EX FAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 No</td>
<td>&quot;WORKING TABLES&quot;: Stainless steel working tables size 5’x 3’x 3’ with mild steel angle frame.</td>
<td>450.00</td>
<td>Each</td>
<td>900.00</td>
</tr>
<tr>
<td>1 No</td>
<td>&quot;SUPER PULPER&quot;: Capacity 2 tones per eight hours shift. It is a best and most efficient pulper manufactured. All parts coming in contact with the fruits are made of stainless steel. The pulper is supplied with two stainless steel blades, two nylon brushes and one s.s. Sieve. A 5 HP motor drives it. It is a complete working unit ready for electrical connection.</td>
<td>2500.00</td>
<td>Unit</td>
<td>2500.00</td>
</tr>
<tr>
<td>1 No</td>
<td>&quot;COLLECTION TANK&quot;: Stainless steel collection tank of 250 liters capacity, which is manufactured in 16 swg. At the bottom outlet a 1.5” IDF Union is provided. The tank is mounted on 4 pipe legs.</td>
<td>1500.00</td>
<td>Unit</td>
<td>1500.00</td>
</tr>
<tr>
<td>1 No</td>
<td>&quot;INSULATED STORAGE TANK&quot;: Stainless steel insulated storage tank of 250 liters capacity. It is manufactured in 16 swg. S.S.sheet. It will have glass wool insulation and a stainless steel lid. At the bottom outlet a 1.5&quot; SMS Union is fitted.</td>
<td>2000.00</td>
<td>Unit</td>
<td>2000.00</td>
</tr>
<tr>
<td>2 No</td>
<td>&quot;LOBE PUMP&quot;: Made in stainless steel alloy with plain rotary case front &amp; externally mounted balance mechanical seal suitable for pumping fruit juice, syrups and pulp. It is driven by a 1 HP motor. Capacity 2 tons per hour.</td>
<td>1500.00</td>
<td>Each</td>
<td>3000.00</td>
</tr>
<tr>
<td>2 No</td>
<td>&quot;STEAM JACKETTED KETTLE: 25 Gallons. The kettle is fitted with a safety device to avoid accidental tilting. Kettles have sufficiently strong structural steel frame stand. All kettles are provided with a spout for pouring and rim is made of solid rod of stainless steel, which is welded, after which the welds are ground round plain and polished. Kettles are 2/3 jacketed to get the most efficient heating of product inside the kettle. Inside thickness is 3.5mm and at the outside 2mm. With anchor type stirrer driven by 1 HP motor and gearbox Complete working unit ready for electrical connection and steam connection.</td>
<td>3500.00</td>
<td>Unit</td>
<td>7000.00</td>
</tr>
<tr>
<td>1 No</td>
<td>&quot;SEMI-AUTOMATIC BOTTLE FILLING MACHINE&quot;: This machine fills a wide variety of liquid i.e. fruit juice, syrups and vinegar etc. in bottle containers and the changes over from one size of bottle of another in matter of minute. A complete working unit is supplied with two stainless steel filling heads so constructed that bottles cannot overflow. Foam and excess liquid is discharged into master cylinder and from the master cylinder it automatically returns to the storage tank. The vacuum unit consists of 1/4 HP single-phase 230 volts motor with vacuum pump. Complete working unit.</td>
<td>2000.00</td>
<td>Set</td>
<td>2000.00</td>
</tr>
<tr>
<td>1 No</td>
<td>&quot;BOTTLE WASHING MACHINE&quot;: Bottle washing machine having two heads and driven by a 1/4 HP single phase 230 volts motor. Supplied with four nylon brushes. The hot water wash tank and cold water rinse tank in</td>
<td>1500.00</td>
<td>Unit</td>
<td>3000.00</td>
</tr>
</tbody>
</table>
combination with bottle washing machine

| 1 No | "LUG CAP SEALER": Can accommodate a wide range of containers. Suitable for tightening pre-engaged lug caps. Provision for heating of lug caps prior to tightening to be done. Provided with a self releasing clutch mechanism to tighten the caps uniformly to a pre-set torque. Caps are to be placed manually. Provided with attachment suitable to tighten any one size of cap. Capacity 12 to 15 caps per minute. | 1500.00 | Unit | 1500.00 |

| 1 No | Crown Cap sealer (Pedal Operated) | 1000.00 | Unit | 1000.00 |
| 1 Set | Stainless steel pipeline, steel pipeline and other necessary fittings. | 1500.00 | Set | 1500.00 |

**TOTAL FOB BOMBAY USD**

25900.00

**CHARGES FOR PROCESS KNOW HOW WILL BE EXTRA USD 1000.00 AND OUT OF POCKET EXPENSES TO CLIENTS ACCOUNT.**

**CHARGES FOR SUPERVISION OF ERRECTION AND COMMISSIONING WILL BE USD 25.00 PER DAY EXTRA. ALL OTHER CHARGES LIKE TRAVELING, LODGING, BOARDING AND OUT OF POCKET EXPENSES TO CLIENTS ACCOUNT.**

**PAYMENT:** 25% advance, balance to be covered by Irrevocable unrestricted site LC.

**DELIVERY:** Within 2 months after confirmation of your firm order and receipt of TT / LC.

**VALIDITY OF OFFER:** One month only.

**FREIGHT:** Extra to pay basis.

**FOR FRIGMAIRES INTERNATIONAL**
### Annex D

#### 2007 Industry Average Tomato Paste Production Cost

<table>
<thead>
<tr>
<th>Expense</th>
<th>% of Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Expenses:</strong></td>
<td></td>
</tr>
<tr>
<td>Facility Capital Expenses (Depreciation &amp; ROA)</td>
<td>5%</td>
</tr>
<tr>
<td>Insurance &amp; Taxes</td>
<td>1%</td>
</tr>
<tr>
<td>Operating Overhead (Administration and R&amp;M)</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Variable Expenses:</strong></td>
<td></td>
</tr>
<tr>
<td>Tomatoes with fees</td>
<td>50%</td>
</tr>
<tr>
<td>Trucking</td>
<td>7%</td>
</tr>
<tr>
<td>Seasonal Labor</td>
<td>2%</td>
</tr>
<tr>
<td>Boiler Energy</td>
<td>9%</td>
</tr>
<tr>
<td>Electricity</td>
<td>1%</td>
</tr>
<tr>
<td>Sewage</td>
<td>0%</td>
</tr>
<tr>
<td>Supplies &amp; Miscellaneous</td>
<td>1%</td>
</tr>
<tr>
<td>Containers</td>
<td>9%</td>
</tr>
<tr>
<td>Operating Interest</td>
<td>4%</td>
</tr>
<tr>
<td>Selling Costs</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>
Annex E

SUN DRIED TOMATOES
(CUT IN 1/2, CUBES OR STRIPS)
PRODUCT SPECIFICATION

Product: Sun dried tomatoes treated with salt
Appearance: Sun dried tomato halves, cubes or strips
Organoleptic characteristics:
Flavour: Typical flavour
Colour: Varying from red to dark red
Chemical characteristics:
Humidity: 18-24%
Acidity: 2-5%
Salt: 8-12%
So2: Max. 100
Physical characteristics:
Foreign materials: None
Stones: None
Soil and mud: None
Hard plastic: None
Broken glass: None
Metal pieces: None
Microbiological characteristics:
- Total Plate Count: <10^5 (per gram)
- Yeast and mould: <10^3 (per gram)
- Total coliform: <10^3 (per gram)
- E.coli: <3 (1 gram)
Storage:
Product should preferably be stored at -4 to 18 C.
Brand:
ARTEBELLA – can be relabelled according to customer’s requests.
Packaging:
10 kg net in carton boxes, in pp bags (can be packed according to customer’s request)
Transportation:
Product should preferably be transported by frigo trucks.
Reference Sources


see 1 Ibid

ii Energy Information Administration: www.eia.gov