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MALI VALUE CHAIN FINANCE STUDY

**USING A VALUE CHAIN FRAMEWORK TO IDENTIFY FINANCING
NEEDS: LESSONS LEARNED FROM MALI**

microREPORT #81

Prepared under **AMAP/Financial Services, Knowledge Generation Task Order**

July 2007

This publication was produced for review by the United States Agency for International Development.

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DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACKNOWLEDGEMENTS

This report was prepared and compiled by Abt Associates under the Accelerated Microenterprise Advancement Project-Financial Services Component (AMAP-FS) Knowledge Generation Task Order. It was authored by Anicca Jansen, Thomas Pomeroy, Joel Antal and Thomas Shaw.

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Anita Campion – CEO, Enterprising Solutions, guided the workshop in Mali, including the discussions on value chain finance, which feed into the report

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I. SYNTHESIS REPORT AND KEY FINDINGS

BACKGROUND

This paper is part of a body of work being conducted under the AMAP FS Knowledge Generation Task Orders with Abt, Chemonics, and DAI focused on value chain finance. The overall goal of the value chain finance work is to understand how best to facilitate finance to and within value chains in order to both: (1) increase the competitiveness of those value chains and (2) increase the incomes of poor households active within those value chains.

The focus of this paper is work conducted in Mali in March through May of 2007. The basic process followed for the study discussed below was to: (1) identify value chains with the perceived potential to grow and benefit a number of low income households; (2) identify upgrading needed for that growth; and (3) identify financing needed for that upgrading.

This paper very succinctly summarizes the issues of end markets, upgrading, and finance. More detailed information is in the full Value Chain Assessment Reports prepared by the field team, and annexed to this synthesis.

Value chain finance is defined as that finance which enables one or more types of upgrading to occur, whether that finance is provided: (1) through and among the value chain actors; (2) from financial institutions to value chain actors; or (3) some combination.

The term upgrading refers to improvements in one or more of four different areas, as defined by Kaplinsky and Morris and others¹:

- 1. Process Upgrading:** Increasing the efficiency of internal processes such that these are significantly better than their rivals, both within individual links in the chain and between links.
- 2. Product Upgrading:** Introducing new products or improving old products faster than rivals
- 3. Functional Upgrading:** Increasing value added by changing the mix of activities conducted within the firm
- 4. Chain (or Channel) Upgrading:** Moving to a new value chain, e.g., switching from the production of transistor radios to calculators, or moving to a new market channel, e.g., from fresh tomatoes in a local market to tomato concentrate for export.

The type of upgrading needed will determine what, if any, financing is appropriate. Conversely, entrepreneurs may be forced into choosing one type of upgrading over another, or a second best solution, because of the type of financing available.

Sustaining competitiveness requires that industries and firms are able to efficiently and effectively upgrade as needed in response to changing market opportunities.

However, one shortcoming of looking at financing in terms of upgrading is that the resulting financial product may not adequately take into account the financial flows (in and out) of the household, for instance when cash is needed to pay land use or school fees. Also, many poor households are engaged in more than one value chain, either simultaneously or sequentially. This must be taken into consideration when designing financial products. Finally, finance will

¹ Kaplinsky and Morris. And For an interesting and informative discussion on upgrading see Lessons Learned on MSE Upgrading in Value Chains: A Synthesis Paper. MicroReport # 71. Prepared by Elizabeth Dunn et al. (www.microlinks.org)

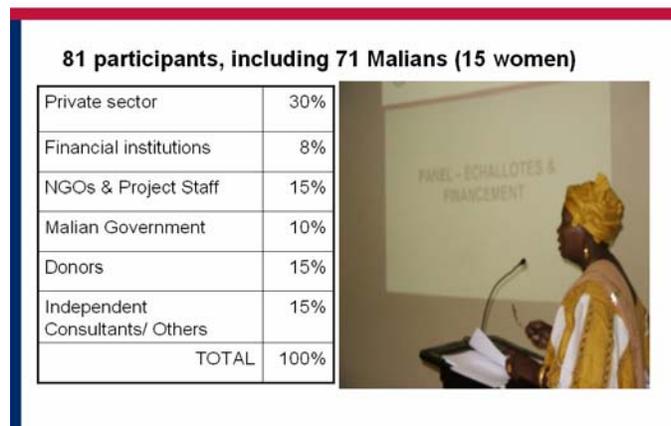
not necessarily be the binding constraint for any of the upgrading steps needed, and it will most likely not be the only constraint. Indeed, in Mali constraints were found to exist around the issues of transport, trust, infrastructure, and information flows, to name the most salient. Therefore, addressing finance without addressing these issues would likely lead to sub-optimal outcomes.

INTRODUCTION

Mali is primarily an agricultural economy, with agriculture absorbing 80% of the labor force and contributing to 45% of GDP. The largest exports are cotton, gold, and livestock. Cotton and livestock, as well as rice, have all benefited from strategic and extensive support from the Government of Mali (GoM), donors, and private sector investors. Mali remains a poor country, but with development potential. An estimated 90% of the cultivated land in Mali is used for subsistence agriculture. Mali ranks low on the Human Development Index owing to the low levels of literacy, but continues to sustain moderate economic growth, e.g., 5.1% in 2006.² And, there remains a huge potential to increase earnings through increased agriculture production and market development for selected commodities.³ For this reason, Mali is an important country for considering at once how economic growth and poverty reduction can be simultaneously pursued. Indeed, linking poverty reduction to the economic growth is imperative to meeting Millennium Development Goals.

Figure 1

Mali Workshop Participants



In March 2007 a team of three agriculture and finance specialists from the firms of Abt Associates and Chemonics International conducted a study of four value chains with potential to both contribute to Mali's economic growth as well as reduce poverty for large numbers of households engaged in those value chains.⁴ As a part of this work the team reviewed numerous existing studies and secondary data concerning Mali agriculture. Following that, they made a two-week field visit to Mali to collect additional first hand information. In April 2007 their findings were presented to a group of key stakeholders in Bamako, and in May the findings were presented to interested parties in Washington DC.⁵

The purpose of this work was to both contribute to the success of USAID Mali's upcoming economic growth activities and to contribute to the advancement of value chain finance analysis

² See http://hdr.undp.org/hdr2006/statistics/countries/country_fact_sheets/cty_fs_MLI.html, and <https://www.cia.gov/library/publications/the-world-factbook/geos/ml.html>

³ http://www.oxfamamerica.org/whatwedo/where_we_work/west_africa/news_publications/mali_cotton/feature_story.2004-12-15.0354385986

⁴ The team was: Tom Pomeroy, Abt Associates, Team Leader; Joel Antal, Abt Associates, and Tom Shaw, Chemonics International. Tom Pomeroy also presented findings for each of the value chain work at the Mali conference.

⁵ The workshop was led by Anita Campion, Emerging Solutions, with support from Djiribil Ba, Chemonics International; Seydou Sidibe, Chemonics International; Mohammed Diarra, CFBM and Jenn Severski, QED
Laura Burns, QED; Natalie Greenberg, QED.

work under AMAP FS Knowledge Generation activities. USAID Mali's objectives were to: (1) Scope out certain value chains and financing needed; and (2) Get all stakeholders on same page, with respect to value chains and value chain finance. For USAID Washington's MD office, the objectives were to: (1) Add to body of value chain case studies - more countries, commodities, and cross cutting issues; (2) Broaden the group of actors involved in AMAP's value chain finance research / field work; (3) Increase the role of the private sector in value chain finance discussions; (4) Tie research to mission objectives; and (5) Test the sequencing of field work and workshops.

The value chain finance study in Mali began with a review of the value chains themselves. In this case the value chains selected were rice, tomatoes, shallots, and potatoes. These commodities were identified by USAID Mali as having some perceived potential for further development, as well as the potential to increase the incomes of large numbers of poor rural households. The team then spent the next two weeks collecting primary information on these four commodities, starting with the end markets. The annex presents the team's findings in detail.

MALI'S COMPETITIVENESS BY END MARKET

The first step in conducting a value chain analysis is to determine in which markets and for what products a country or region can be competitive. The following section summarizes the team's findings with respect to the four commodities and Mali's competitiveness.

Global Market. The team found limited opportunity for the four commodities in global markets at this time but did not rule out some future market for dried shallots and dried tomatoes. There is more discussion on this on a commodity-by-commodity basis in the Annex.

Regional Market. Regional markets are a different story. Although Mali is a net importer of rice, there are reportedly some exports of rice, e.g., to Mauritania. Currently there are already some exports of shallots and potatoes to regional markets. As the team notes, it is estimated that between 1,000 MT - 2,000 MT of potatoes are exported from Sikasso each year, primarily to Côte d'Ivoire (RCI) and Burkina Faso, although a small amount is exported to both Ghana and Togo. The team notes that the export of potatoes to RCI is highly organized and that it would be difficult for outsiders to enter into the established marketing system. Burkina Faso, Ghana, and Togo, however, offer greater potential for market expansion, provided the price is competitive with local production and import. There are no significant barriers to entry into the wholesale system in these countries. The USAID/Trade Mali project has facilitated some export to Togo and Ghana, as discussed in the full report in the Annex.

About 10-15% of national shallot production is exported to RCI and Guinea, whose traders travel to Mali to purchase and export large amounts of fresh shallots, and continue to purchase the dried, packaged shallot when the fresh product becomes scarce and several more times as costly. Because of limited storage, processing, market information and access, as well as the immediate need for cash, growers are eager to sell to exporters at harvest, accepting 75 – 125 CFAF/kg. (about \$0.13 to \$0.23 per kg).

As a tomato producer, Mali is relatively insignificant in the sub-region, producing only 2% of the West African total, compared to Nigeria which grows 50% of regional tomato output. Ghana and the Cote d'Ivoire, whose populations more closely match Mali's, grow jointly 25% of West African tomatoes. Senegal produces just 50% more than Mali but has comparatively significant transformation and strategic export advantages, difficult if not impossible to replicate in Mali. Other countries in the region make up the balance.

Local Market. Locally there is clearly a market for potatoes, shallots (fresh and dried) and fresh tomatoes. However, tomatoes are a tricky crop for several reasons. First, Malians prefer fully ripened tomatoes which means that produce must be sold within about three days of harvest. Imported tomato paste is readily available and affordable. And, a past effort to process local tomatoes on a commercial scale ended in failure. There is little to no desire among Malians for dried tomatoes. In addition, tomatoes are an easy entry product and the value chain is easily subject to gluts at various and unpredicted times. While the taste of Mali rice is preferred on the local market, and Malians were willing to pay the slightly higher price, producers cannot compete with the low cost of imported Asian rice in coastal markets in the region.

Thus, in terms of end markets, the team found that potatoes and shallots offered the best opportunities from among the four crops reviewed, with potential to be competitive in both regional and local markets.

Table 1: Mali's Competitiveness by End Market

VALUE CHAIN \ MARKET	Rice	Tomato	Shallot	Potato
GLOBAL	Not competitive	Possible market in Europe for dried	Possibly fresh, dried	Not competitive
REGIONAL	Asian imports much cheaper, Mali quality may be a selling point.	Modest possibilities in Senegal for concentrate, and fresh. Regional market for dried uncertain	Good current market for fresh, future market for dried.	Good market demand if Mali has supply
LOCAL	Imports cheaper but Mali rice is preferred.	Fresh – good market Canned – competition from imported Italian paste imported	Strong demand for shallots (other onions not a substitute)	Excellent domestic market Imported in off season
SUBSISTENCE / GROWER CONSUMPTION	Rice is key staple in urban and rural areas	Strong demand for fresh tomatoes but not cherry or dried.	Strong demand for fresh and dried shallots -- used in 2/3 of sauces in Mali	Fresh potatoes are an important source of food

UPGRADING OPPORTUNITIES

Given the potential end markets in which Mali could be competitive, the team then considered the upgrading opportunities which would be indicated for each of the four value chains. As much as possible the team tried to adhere to the value chain framework typology for upgrading, i.e., process, product, functional, and channel/chain upgrading. However, it was not always

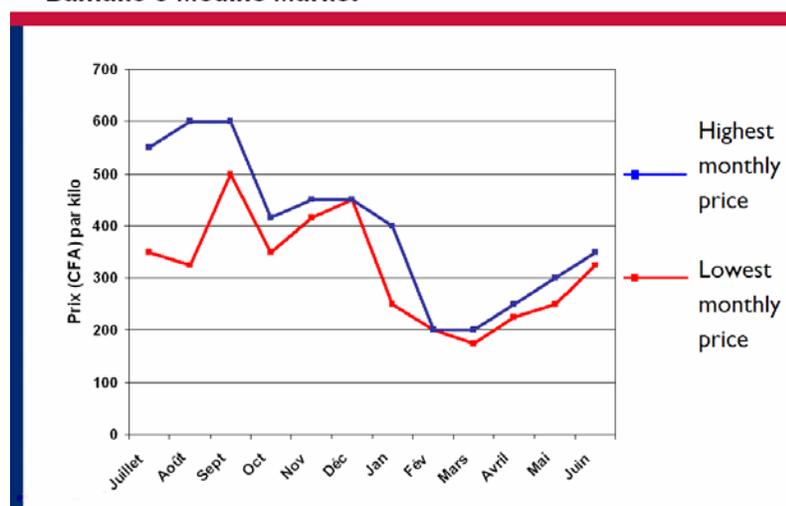
evident whether various types of upgrading were “process” or “product” in nature. So, the reader may disagree with some of the classifications.

Cross-Cutting Upgrading Opportunities. An unintended consequence of reviewing four value chains at the same time was the identification of cross cutting upgrading opportunities. This upgrading tended to center around information, communication, and logistics technologies, with better information flows, a more organized trucking dispatch system, and improved end market information seen as a potentially benefiting every value chain.

As a first step to addressing these upgrading needs, a half day of the Mali workshop was devoted to ICT and logistics. This time was used to present the use of cell phone technologies for obtaining market prices and making money transfers, as well as the use of cell phones combined with GPS for tracking trucks.⁶ The international shipping company, Maersk, discussed with the stakeholders the use of tracking, and refrigerated containers.

The benefit of better ICT and logistics is in terms of getting product to buyer faster, with more certain timing, in better condition, and in improving trust among value chain actors, both in terms of vertical and horizontal linkages.

Figure 2. Seasonal Fluctuation of Potato Prices in Bamako’s Medine Market



A second cross cutting upgrading opportunity is with storage, though the actual type of storage would vary among value chains. Controlled climate storage would be particularly beneficial to the Malian potato producers, enabling them to better compete with European imports which take over the market in May through December, profiting from high prices (see figure 2). However, refrigerated storage would be cost prohibitive. Electricity in Mali is so costly that the team

estimates that adding the cost of refrigerated storage to locally produced potatoes more expensive than European potatoes, even considering shipping costs.

The fresh shallot chain would also benefit from better storage although there is a good local market for dried shallots. With simple technologies available for drying shallots, focusing on drying, packaging, and branding dried shallots might be a better end market and upgrading focus than fresh shallots which would require investment in cold storage and dealing with a more perishable product.

A cross sector approach to improved storage would provide a base for a broader approach to warehouse receipts financing. Under support from USAID as well as other donors, Mali has developed some basic “credit stockage” programs which are something like a “warehouse receipts lite” program. Used so far primarily for grains, credit stockage allows producers to store their crop in a secure warehouse and obtain credit against it. At this time, crops are not graded or insured, but the beginnings of a secured warehouse receipts system are emerging. Through

⁶ See (see www.tradenet.biz) and see g-cash video at http://www.microlinks.org/ev_en.php?ID=9903_201&ID2=DO_TOPIC)

the existing credit stockage activities producers and finance providers are seeing the possibilities of and benefits of storing produce for more controlled timing of sales.⁷

Table 2: Average standard rates of fertilizer application (kg nutrient/ha)⁸

Crops	Nitrogen (N)	Phosphorus (P2O5)	Potash (K2O)
Rice	200 to 220	140 to 145	150 to 180
Cotton - average fibers	215 to 240	145 to 165	95 to 110
Cotton - fine fibers	230 to 250	155 to 165	100 to 110
Potatoes	120 to 150	85 to 100	60 to 75
Vegetables	145 to 200	100 to 110	70 to 75

Improved inputs are another cross-cutting upgrading issue. In this case, the issue is more that because cotton and rice are more systematically supported than other crops in Mali, it is inputs for those crops that are most readily available. Producers report using rice and cotton fertilizer for vegetables because the fertilizer is available and because they can get financing to purchase it. The team did not look at whether fertilizer was being diverted from its intended use, or if this was surplus fertilizer, though an Oxfam report suggests this diversion is occurring.⁹ Table 2 shows differences in nutrient requirements for the four commodities.

The same is true of pesticides, resulting in pesticides for cotton being inappropriately used on food crops. These inputs may cost more and be less effective than crop-specific inputs, and create food safety issues in the case of pesticides.

And, finally, improved control over water and irrigation systems was found to be important, particularly for potatoes and rice, but also for tomatoes and shallots.

Value Chain Specific Upgrading. Value chain upgrading needs by value chain are presented in table 3 below, and described in more detail in the Annex. The dried shallot market was found to be particularly interesting by the team. In addition to the cross cutting upgrading discussed above, expanding the dried shallot market would require better quality slicing, drying, packaging, and branding. Women’s cooperatives are already engaging in “functional upgrading” moving from production to marketing and export. And the Government of Mali is actively engaged in product upgrading, researching new types of shallot bulbs.

⁷ See http://www.usaidmali.org/article.php?id=0058_EN&lan=en&skin=1

⁸ Source: <http://www.fao.org/docrep/006/Y4711E/y4711e07.htm> . These figures are for Uzbekistan and are expected to be somewhat similar for Mali.

⁹ According to an Oxfam report, government programs in Mali only loan money to farmers to buy fertilizer if they grow cotton. Most farmers divert some fertilizer to corn and millet fields because they need to maximize these crops to ensure food security. Reducing the amount of fertilizer used for growing cotton will also reduce the yield. Farmers with animals can supply their own manure and significantly cut their costs. With respect to pesticides, that same report also states farmers in Mali, like many other cotton farmer around the world, use pesticides to grow cotton. They are encouraged to do so through government loan programs and pesticide company marketing efforts. Heavy pesticide use has major environmental and health costs. Due to their lack of resources for training in alternatives for Mali's cotton farmers, organic production is well out of their reach.

Table 3: Recommendations to Improve Mali’s Competitiveness by Value Chain

	RICE	TOMATO	SHALLOT	POTATOES
PROCESS	Improve milling. Stagger plant/harvest timing. Maintain quality in harvest and storage. More irrigation & better inputs	Explore dried tomatoes Improved chemical choices, application, and handling.	Better quality slicing machines, drying, packaging, branding. Cost effective storage to extend shelf life	Stagger plant/harvest timing. Disease & water control Cost effective storage to extend shelf life.
PRODUCT		Use new varieties such as cherry tomatoes or varieties suited to processing	Government is developing new seed bulbs with desirable color and size.	
FUNCTIONAL	Improve logistics Coops poised to move up marketing channel. Share better info on consumer preferences & incentives	Better information on consumer demand & incentives at all levels.	Women’s processing coops expand to high value urban marketing.	Need improved logistics, to optimize use of transport and warehouses.
CHANNEL	Improve branding. Use channels for other products	Explore regional market for fresh, dried, concentrate.	Use channels for other products.	Increase regional marketing

FINANCING FOR UPGRADING

Because much of the upgrading needed is cross cutting, much of the financing needed is also not value chain specific. Medium and long term credit is needed across the board to support better packaging, storing, and transporting. While certain entrepreneurs have been able to crack the financial system and obtain letters of credit and longer term financing, the market in general remains underserved by these services, and financing would loosen up these supporting markets. For example, under investment in trucking logistics means inefficient use of trucks, e.g., low volume or delayed back hauls, overloading when trucks do arrive, selling at low prices because the arrival of the next truck is not known, etc.

Financing may be needed to further develop information and communication technologies and improved logistics. However, the need for financing for these particular activities was not explored during this review. With large firms currently active in these services there may be some opportunities for franchising, leasing, and other forms of within value chain financial support. These are service areas which will benefit the economy overall and which will aid firms and producers in making more informed choices about what to plant when and how to sell in order to get the highest return.

One would expect that financial institutions would be more likely to offer loans for activities with a high likelihood of success, than when outcome is uncertain. However, the financial institutions

may require more exposure to market opportunities, both value chain specific and cross cutting in order to make that judgment. In addition the banks may still require further professional development. A troubling piece of information shared during the Mali workshop by one participant was that he would not want to take a good business idea to a bank because the bank officer would likely share that information with a relative who would then run with the business idea. Whether this is based on reality or perception, this is an issue of concern.

The issue around short term financing (less than one year) for production is not that it is not available, but that financing may not be well tailored to the financial flows of the households using that finance. Mali is notable in terms of the number and coverage of MFIs, primarily credit unions, in rural areas. This is in part due to long term interest by the Government of Mali and foreign actors in assuring there is financing for grains and cotton. However, MFIs have not fully adapted their products to the financial flows of their borrowers, outside of these key crops.

Having said that, with rice producers already being price takers, increased national production could lead to a fall in prices and decrease in net earnings per ton, unless existing marketing channels become more efficient and /or new market channels are developed. Excessive promotion of input financing without marketing improvements could even result in producers being worse off.

In addition to the specific findings of the Mali team with respect to upgrading and financing needed, the field work also provided some broader insights into value chain finance. These are not necessarily new findings, but rather they help us consider as we develop a value chain

Figure 3

**MALI WORKSHOP GROUP ACTIVITY –
key stakeholders together designing a financial product**



finance framework, how the analysis must go beyond the simple supply and demand of credit.

One valuable lesson was the need to take into consideration how financing, or lack thereof, affects the overall competitiveness of the value chains. In particular, when household financial flows are not taken into account the competitiveness of the value chain is compromised, and the economic benefits to the producer are reduced. Poorly designed financial

products will result in producers either defaulting on their loans, because cash is needed for other more urgent expenses (e.g. inputs for counter-season crops or family expenses), or producers will be forced to sell their crops at sub-optimal prices (during the glut at harvest time) or in sub-optimal condition (e.g., high moisture or immature size). As occurred in Mali, these reactions result in lender distrust for the entire value chain (in the case of potatoes), in low quality products (in the case of where shallots were “yanked” too early), or poorer returns to the producer (in all value chains).

Another consequence evidenced in Mali is that the high focus on cotton and rice “value chains” resulted in the inputs and financing being readily available for those crops being applied to counter season crops. This resulted in farmers using cotton and rice fertilizer and pesticides on potatoes and tomatoes. In the case of potatoes this resulted in a sub-optimal crop (potatoes with weak skins subject to deterioration and disease) that later impacted on the exporters trying to move a crop with a lower shelf life than it could have had. In addition, non-food pesticides were used on potatoes and other food crops, creating not only a productivity issue but a food safety issue as well.

When producers must sell their crop in order to meet immediate financial obligations there are a few different scenarios that occur. Each of these scenarios was evidenced in the Mali research. The first scenario is when farmers prematurely harvest their crops in order to have cash as soon as possible. In the case of shallots this early harvest results in a crop that is high in moisture with shorter storage life than if they had been left in the ground, thus affecting product quality and influencing perceptions of the crop. A second possibility is that producers default on their loans and use the cash for other purposes. This is what occurred in the case of potatoes, where several producer groups defaulted on their loans in the 2005/2006 season. The explanations for why this happened vary but this appears to have resulted because of a combined immediate need for cash, (some growers said they needed to finance their sweet potato inputs) and poor or absent loan agreements between the association and the growers. The outcome was the financial institutions refused to finance seed potatoes the following year resulting in a 55% drop in seed potato imports and a subsequent significant drop in potato production in the 2006/2007 season. A third scenario is that producers sell on spot markets at harvest time. The result is that producers are price takers and have to accept whatever payment is offered. The outcome is that producers accept low payment and may be unable or barely able to repay loans and meet their most basic needs. They are financially unable to make any kind of upgrading improvements, thus unable to contribute to increased competitiveness.

SUMMARY

As this account shows, the team took a deliberate and careful look at the value chains before ever beginning to address finance. Some key points on financing are then that the finance design begins with the end market goals and the upgrading needed to reach those markets. However, the constraints to upgrading should not be assumed to be financial in nature, and may include issues of trust, logistics, information flows, etc. In addition, the constraints to upgrading may not be value chain specific and may be better addressed as a cross cutting issue, as is the case with transport. Simply focusing on one level of the value chain may result in, for example, increased production, with no means to get product to market. A focus on warehouses or warehouse receipts, might result in storage or financing, with no where to sell the product.

At the time of product design, the financing must take into account the cash flow at the household / firm level, particularly when the product is targeted to poor households with limited resources. As noted earlier, many poor households are engaged in more than one value chain, either simultaneously or sequentially. This must be taken into consideration when designing financial products.

In summary, the value chain approach provides a useful inductive structure for determining gaps in financial services.¹⁰ By following this framework, finance is placed in the position of a

¹⁰ <http://www.criticalthinking.com/company/articles/inductive-deductive-reasoning.jsp>

supporting service and not a driver or key constraint for the development of any value chain. This avoids the oft committed error of providing finance for finance sake, and this approach also helps insure that any interventions in the financial sector are geared toward economic activities with both the potential to support economic growth and poverty reduction. Further, by simultaneously examining several value chains it was possible to identify cross cutting economic opportunities, which can also benefit from access to financial services, e.g., transport, transport logistics, and ICT.

The team did a fantastic job given the very short time frame for this work. However, much more remains to be done. Other issues left to explore include further examination of end market potential, and more detailed focus on financial product design. The banks and financial institutions do seem to need further support in terms of better understanding the value chains, analyzing their potential and the role of financing in upgrading. Also, the banks and non-bank financial institutions (NBFIs) need further support in learning to assess the cash flows of their clients and incorporating this information into product design.

There are other value chain issues that were touched on by the team but not fully explored, and beyond the scope of work for this activity. One important issue is that of governance and how financing does and does not contribute to power relationships and exchanges at different nodes in the value chain, that is, the political economy of value chain finance. While this is not a private sector concern, donors do need to better understand both how financing contributes to the competitiveness of the value chain as well as how the financing affects households and firms. As suggested in the above discussion on rice, financing could make Mali rice more competitive overall, while at the same time making producers poorer. It is for this reason that donors need to understand the entire value chain before supporting finance to and for that value chain. Further, stakeholder workshops, such as that held in Mali as part of this effort, and information and communication technologies can be further exploited to help producers themselves understand value chain dynamics in order to make more informed choices, and improve their positioning in the market place.

II. VALUE CHAIN ASSESSMENT REPORTS

POTATO VALUE CHAIN

Malian potato production occurs during the dry season from early September, after the last rains have occurred, through late March, when the climatic conditions become unfavorable (too hot) for its production. While potatoes can be grown throughout the country, production is dominated by two major producing areas, the regions of Sikasso and Katibougou/Koulikoro. These two areas supply potatoes to the entire country and allow for a limited but growing export market to the neighboring countries of Cote d'Ivoire, Burkina Faso, Ghana, and recently Togo.

The Sikasso region alone accounts for 50,000 MT¹¹ of an estimated total annual production of 60,000 MT (GEOMAR Study, 2006), while the Katibougou/Koulikoro regions produce the remaining 10,000 MT each year. Studies have indicated that there may be an overall potential for production of 200,000 MT per year; however, a large number of constraints would have to be addressed, especially storage and producer organizational development, before this potential could be realized.

Men dominate the actual production process (growing in plots), although there are likely a few women involved in growing potatoes as well. Women, on the other hand, are the retailers in all of the Malian markets.

Given the semi-perishable nature of potatoes, the women market retailers generally purchase a maximum of seven days of sales' supply at a time. This prevents the small to medium retailers from receiving bulk purchase discounts from the large potato traders, who buy in the villages and bring to the market areas for resale.

Malian production is available in the markets from late December through the end of May. While there is a limited amount that is properly stored for later sales, these sales rarely exceed early June. From June until late December the potatoes in the markets are imported from the Netherlands via Abidjan and Dakar. This amounts to six months in which local production is not available. Exports from the Netherlands to Abidjan and Dakar were respectively 44,000 and 58,000 metric tons in 2005. Exact figures on how much of this is re-exported to Mali were not available, although antidotal evidence suggests that it is significant.

The Netherlands has a long tradition and expertise in potato cultivation, storage, processing, and export. The breeding of new varieties has reached a high degree of perfection and a worldwide distribution network has been developed. Potato production varies slightly from year to year, but is generally around 7,000,000 MT. The production level has a direct effect on the price of the potatoes. The greater the production the lower the cost, especially for the quantities exported to other countries, Africa included. Dutch potato production is among the most efficient in the world with production averaging 43-47 MT per hectare depending upon the soil type (clay soils or fen land) and the type of potatoes grown (seed potatoes, consumption potatoes and processing purposes potatoes).

KEY CHARACTERISTICS

¹¹ A metric ton (MT) is 2,200 lbs.

The Malian Potato Value Chain is characterized as follows:

- There is a very small number of seed potato importers¹², whereby the amount of import credit provided by the banks/MFIs determines the quantity of seed potato available each year.
- All seed potatoes are imported from Europe, either from France (primary source) or from the Netherlands (secondary source).
- Seed potato orders are placed in July and August for delivery to Mali in late September or early October.
- There is a very large number of potato producers (all male), the majority of whom are located in the Sikasso region, with a smaller concentration in Katibougou and additional limited production throughout the remaining regions of the country.
- Input credit is provided to the producers through producer associations, cooperatives and as individual producers. The main credit suppliers are BNDA, Kafo Jiginew and Kondo Jigima. BMS previously provided credit in the Sikasso region but did not provide any for the 2006/2007 growing season due to the high level of delinquency/default from the 2005/2006 production season.
- The type of fertilizer used is not specifically intended for potatoes, although one tailored for garden crops, including potatoes, is under limited trials in Sikasso. Generally, producers use whatever fertilizer is available in the local market, which is generally that which has been imported for either cotton or rice production. While this fertilizer works, it is probably not ideal and possibly more expensive than is necessary.
- The same is true for pesticides; i.e., the type that is available is intended for cotton. It is therefore likely that a latent health hazard exists in using this broad-spectrum pesticide for potatoes because there may not be sufficient time between application and harvest.
- While the producers receive credit through their producer associations or cooperatives there is little or no organized sale of the production. Even where there should be sales through the cooperatives to repay input loans, side selling is prevalent.
- Attempts to organize villages to harvest at different times over a period of about two months, to smooth out the sale prices, have so far failed because individuals insist on going outside the arrangement to sell their production to get cash immediately.
- There is no storage credit available through the banks or MFIs, which would encourage individuals to sell through the cooperatives. There are currently three “improved” storage models being tried that show potential. If they are successful, it would be possible to store the potatoes for two to four months longer than current traditional methods allow. This would take advantage of the price increase that occurs during the rainy season, when only imports from the Netherlands are available.
- There are no cold storage facilities available in Mali for potatoes, nor are there any realistic plans for the construction of one or more in the foreseeable future. One seed potato importer indicated that their company had prepared a proposal for the construction of a 5,000 MT facility in Sikasso but that no bank was interested. In fact, it is likely that the operational costs would make the stored potatoes more expensive than

¹² There are three in Sikasso, which were visited during this study. The existence of one in Katibougou was identified by the MFI, Kondo Jigima, who is provided the importer with a 20,000,000 CFAF credit in 2006.

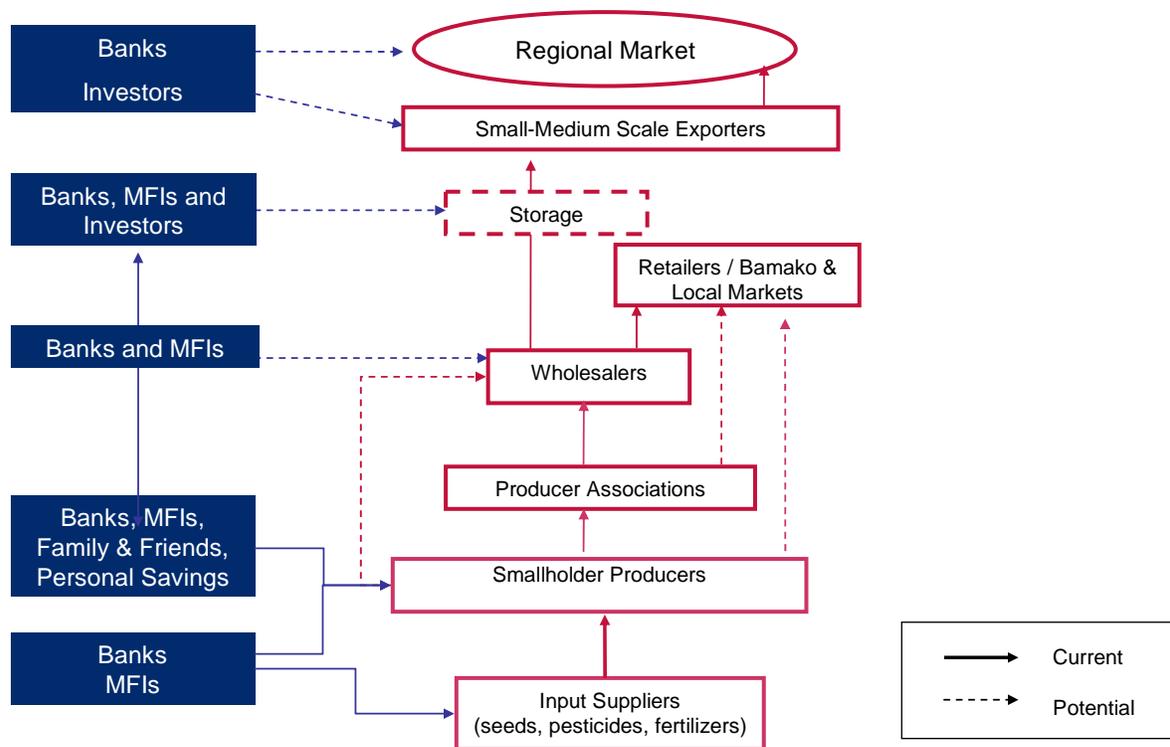
those imported during the rainy season from the Netherlands. The cold storage facility that is being built at the Bamako airport is destined for mangoes, green beans and other crops that have high value niche markets in Europe.

- The European potato market is dominated by the Dutch.

The detailed value chain process is demonstrated below. Although there is opportunity for collusion among the suppliers in price setting for seed potato supply there is surprisingly little interaction or information exchange between them.

Figure 4

The Potato Sub-sector: Mali



INPUT SUPPLY

The importation of seed potato is limited to a small number of importers (suppliers), three of which are located in Sikasso and one in Katibougou. Seed potato stock for other areas of the country are likely sourced from either Sikasso or Katibougou. This resale process may be official (direct sales by the importers) or unofficial (resale by the growers after reception through a loan package).

Producer loan delinquency from the 2005/2006 growing season had a significant negative impact on seed potato imports for the 2006/2007 season. Table 4 shows the quantity of seed potato imported over the last two growing seasons. Quantities for 2006/2007 have decreased by almost 55% overall and between 33% and 90% depending upon the individual supplier. Not only were less seed potatoes available to growers, but the cost also increased because of

higher costs (bulk discount no longer given because of the smaller quantities) and the application of import taxes for the first time¹³.

Table 4: Seed Potato Importations in Sikasso

Importer	2005	2006	Difference
Sikassoises	900 MT	600 MT	- 33.33%
Cikelaw Jigui	250 MT	24 MT ¹⁴	- 90.44%
InterAgro	400 MT	74 MT	- 81.50%
Katibougou	N.A.	N.A.	N.A.
Total	1,550 MT	698 MT	- 54.97%

In addition, one of the family members of a seed potato supplier purchased 800,000 FCFA of seed potatoes from his family's company, at the going rate of 19,500 CFAF per 25 Kg box, and resold them for 35,000 FCFA each in cash. This is a 79.5% increase in price.

Those that received the seed potatoes on credit were not affected by this unfortunate speculative transaction, since they received the potatoes at 19,500 CFAF per 25 Kg box. It was further rumored that some of 25 Kg boxes that were purchased at 35,000 CFAF were resold in the rural areas for 45,000 – 50,000 CFAF each. This could not be verified.

Two of the seed potato suppliers have exclusive (preferred) import relationships (exclusivity) with their French and Dutch suppliers. This is seen as a more efficient and trustworthy arrangement for both parties. It further lessens the risk of problems with international financial transfers.

Since the preferred importer has the exclusive rights to import a certain variety of potatoes, the European exporter refers any new importation inquiries to their preferred importer. This constitutes a barrier to entry for new seed importers, unless they wish to import non-proprietary varieties that may no longer be desired by the producers.

The importation of seed potato relies heavily on the use of bank letters of credit and in one case of a cash loan from an MFI. The bank letters of credit are financed primarily through the BNDA, although BMS has financed one in the past; i.e. before the 2006/2007 growing season. BMS has since refused to finance any further importations because of outstanding debt by the growers from the 2005/2006 season.

This has meant that the one cooperative-based importer, Cikelaw Jigui, was refused a letter of credit for the 2006/2007 season, even though it had repaid its entire loan on time for the 2005/2006 season. BMS was not willing to finance any growers until all outstanding amounts are repaid, which thus meant that the importer would not be financed either. This required the importer to find other resources to import seed potatoes for 2006/2007.

¹³ It is unclear exactly what has occurred. One source said that this is due to the application of standard import tax regulation for all of the West African Economic and Monetary Union countries. Another source said that there was still an exemption for potatoes but that it was not applied for some reason this year. The growers put the blame directly on the importers and did not believe that the taxes had been a price factor.

¹⁴ Although 188 MT were ordered only 24 MT arrived. The supplier has filed for bankruptcy and is currently under liquidation in the French courts.

Unfortunately, the quantity of seed potatoes ordered did not arrive on time because the French exporter went bankrupt at the same time Cikelaw Jigui's advance arrived in the exporter's bank account. Eventually four of the expected fourteen containers arrived; however, it was already January and very late for the production season. In fact, the 2007 potato production from Katibougou was already being sold in Bamako by the time the seed potatoes were received in Sikasso. It is unclear exactly how deeply this has affected production but producers who plant in January are unlikely to produce the large, higher value potatoes before the temperatures become too high in late March.

Kondo Jigima finances the seed potato importer in Katibougou with a 20 million CFA credit. This importer does not use a letter of credit but pays a cash advance to his supplier. Since no visits were made to Katibougou, there is no direct information on how much and under what terms and conditions the seed potatoes are imported. The quantity of seed potato imported is also unknown.

In addition to seed potatoes, producers need fertilizer and pesticides. While the bank and MFI loans to growers include the purchase of fertilizer and pesticides, these inputs are not supplied directly by the seed potato importers. During the field visits it was not clear exactly how this relationship is handled, although it is other local traders that provide these inputs.

What is clear is that the producers have access to the fertilizers that are normally used for cotton or rice production. Those are the fertilizers are available locally. Since the market demand is fairly limited at this time, there is unlikely to be much incentive for an importer to bring in a more specific fertilizer or pesticide. One of the importers in Sikasso, the Sikassoises, however did indicate that there has been research on the use of a better type of fertilizer for vegetable production. Most producers are unaware of it. According to the importer, the specifically adapted fertilizer (Hydrocomplex Partner sold by Yara Mail SA) requires only twenty-five kilos of fertilizer per 25 kilogram case of seed potatoes planted. This is half the dosage for the other types of fertilizer.

While the cost per kilo is slightly higher, the use of half the amount of fertilizer would significantly reduce loan costs, both in principal and in the interest paid on the principal. It appears that a stock of 1,600 MT is already available for sale in Sikasso since 2005. This information is not readily available at the producer level nor is anyone actively promoting its use for the next growing season.

There is further an issue with pesticide use, since the one most commonly used is meant for application on cotton, which is not a food crop. Insect attacks on the potato plants are frequent so pesticide application is required, but recommendations for more environmentally friendly formulations are not a visible concern of the growers.

There appears to be a fair amount of research on the use of appropriate pesticides for potatoes. Once again this information is not available at the producer level. Neither is the correct pesticide(s) readily available for sale. Once again, the excess supply of pesticides imported for cotton production is what is readily available on the market. This pesticide may have a long-term negative health impact on consumers.

PRODUCTION

Potatoes are grown by a large number of smallholder producers. In the Sikasso region, potatoes are grown in the same plots where inland rice¹⁵ is grown during the rainy season. This

¹⁵ The inland rice is grown exclusively by women. This commodity is covered under the section on rice.

means that there are significant fertility issues with the land. It appears that the soils have become fairly acidic with a pH estimated at 4.5, while the recommended level is pH 6 – 6.5. The only affordable option to decrease the pH that was mentioned is the use of properly produced compost. Once again no information on addressing this issue is readily available at the producer level nor is there information on how composting can reduce costs (less fertilizer) while still achieving the same or higher levels of production.

There is a significant pest problem for potato production throughout Mali, especially from nematodes. While effective chemical treatments are possible according to the research experts, the soil must be left unused for at least 60 days for the treatment to be effective. This would mean abandoning production for an entire season on the treated areas. A better alternative is crop rotation, whereby potatoes are grown on the same plots only once every three years. Application of this type of rotation will be difficult because there is not sufficient land to produce the same quantity of potatoes on a yearly basis without significant investment in land improvements.

If markets for alternative high value crops were readily available and producers were willing to voluntarily alternate crops, based on a predetermined and mutually agreed upon calendar through their cooperative or producer associations, then this would improve production per hectare and lower the losses due to pest attacks. Given that side selling is currently so prevalent, it is unlikely that this type of organization and production compliance will occur in the near future without significant organizational assistance.

While no reliable grower production information was available, published data indicate that yields are around 24 MT per hectare. This is a little more than 50% of the yields obtained in the Netherlands (40 – 42 MT/ha) so there is still potential for production improvements to increase yields. Total production is estimated to vary between 40-50,000 MT per year in the Sikasso region and approximately 10,000 MT per year in the Katibougou/Koulikoro regions.

The quality of the potatoes grown in Katibougou/Koulikoro region is considered lower than that from the Sikasso region. Market women said that Kati potatoes have much higher water content and do not conserve well; i.e. they start to spoil after about three days. They also grow more quickly and are thus harvested earlier. Since Katibougou is very close to Bamako, the cost of transport is less expensive, which makes them cheaper to buy and sell. Producers in Sikasso avoid sending potatoes to Bamako until the ones from Katibougou are finished.

This year potato prices are higher than they would normally be at this time of year, due to the limited production in Sikasso. The 55% decrease in seed potato importations in the region means that many of the traditional smallholder producers are not growing potatoes this year. It is likely that ground nuts and shallots are being grown instead since these seeds/bulbs are inexpensive and readily available. They also require less water than potatoes.

While it is likely that everyone will return to potato production once credit is again available, the experience of growing rotational crops needs to be explored. The limited amount of credit that will be available until most delinquent loans are repaid may help decrease pests and improve soil fertility.

Growers require formal credit to produce potatoes. Without production credit, the amount of cash needed to produce potatoes is not available. Even if someone could afford the seed potatoes (cash payment) it is unlikely that they would be able to buy sufficient fertilizer and pesticides in cash. This will likely mean very low yields for this growing season.

SALES, TRADE AND COMPETITION

While the marketing of potatoes through the village associations and producer cooperatives (that are used for input supply and production credit) offers a real opportunity for improving grower income, almost no one takes advantage of this option. Even when the producers have previously agreed to market together, side selling occurs. This is a serious issue. It is preventing the smallholder growers from earning higher (price) returns on their production. Since the primary motivation for side selling is related to individual cash flow needs at the harvest period, it would require a working system of collective marketing and access to formal storage credit to fully resolve.

While no written data was available to confirm the assertion, the growers visited indicated that a 100 CFAF per kilogram price would allow producer to earn enough income to cover input, finance and labor costs and still have a reasonable amount of cash left for household expenses. This of course, ignores the variable pest, soil or seasonal climatic conditions that could prevent an individual grower from achieving or exceeding the average production figure. However, when compared to the market sales prices¹⁶ over the last fifteen months, it is clear that consumers can and will pay for potatoes throughout the entire year.

Market prices are lowest starting about mid-January and highest around mid-December (table 5). Retail prices vary from about 200 CFAF in January to over 600 CFAF in November and December. If producers were willing and financially able to stagger their harvest over a six to eight week period, then it would be possible for growers to receive a premium of 10-30% in average sale prices. Storage of these potatoes through July, August and possibly September could increase this price premium to over 50%, even after deducting storage and finance expenses.

Table 5: Market Sale Price Ranges in CFA/Kilogram for First Choice Potatoes

Location	2006				2007
	Jan – Mar	Apr - Jun	Jul - Sep	Oct - Dec	Jan – Mar
Bamako (Dibida)	200- 400	225-350	350-600	500-600	515-575
Bamako (Médine)	200-400	250-350	350-600	500-600	415-600
Kayes	250-450	300-400	300-400	500-650	250-600
Mopti	200-500	250-400	400-600	500-750	300-400
Segou	175-450	200-350	350-500	500-600	300-350
Sikasso	170-275	200-275	275-500	325-570	220-250

One international non-governmental organization, ISCOS, is attempting to improve the grower organization through the transformation of their current producers' association, the "Association des Producteurs de Pomme de Terre de Sikasso (APPS)," into a formal registered cooperative. While APPS currently has more than 4,000 growers in 102 producer associations, the new cooperative is going to be more selective at first, to ensure that its members are those that are most active, repay their loans on time and are willing to work together to organize the marketing of their production.

¹⁶ The market price data was collected by OMA, the "Observatoire du Marché Agricole," the Malian government agency that collects weekly market price information on many agricultural products, including potatoes.

It is estimated that between 1,000 MT - 2,000 MT¹⁷ of potatoes are exported from Sikasso each year, primarily to Côte d'Ivoire and Burkina Faso, although a small amount is exported to both Ghana and Togo. Exports to Côte d'Ivoire are well organized by the local traders. They make use of the trucks that are returning from deliveries to other destinations in Mali to ship potatoes to Abidjan. These exporters have organized (verbal) contracts with wholesalers, generally among the Lebanese traders in Abidjan for the purchase of the potatoes. It is difficult for outsiders to enter into this system and thus there is not a great opportunity for expansion at this time. Burkina Faso, Ghana, and Togo, however, offer greater potential for market expansion, provided the price is competitive with local production and import. There are no significant barriers to entry into the wholesale system in these countries.

As such, support from the USAID/Trade Mali project has facilitated contacts with potential buyers in Togo and Ghana. Exports to these countries have produced mixed results during the first year; i.e., one very positive experience in Togo and one negative experience in Ghana. While this type of initiative has potential, there are two critical issues that have to be addressed.

First, there is the issue of finding backhauling space; i.e., finding trucks for transport, which are already returning to the desired destination. Even if the producers have contracts with wholesalers they cannot simply hire transport to deliver the product. The truck must be returning empty to the desired destination (which is easiest), or there must be a load waiting at the destination to return to Mali (which is more difficult).

Second, there is the issue of receiving advances from the purchasers and ensuring a means of contract enforcement for payment of the outstanding amount upon delivery. This issue requires time to build up trust between the two parties.

STORAGE

The only sure method for long-term (up to one year) storage of potatoes is to use a cold storage facility. Energy costs and frequent load shedding; however, make this method prohibitively expensive. Any additional storage costs must be factored into the eventual sales price. This price, in turn, must still be competitive with European imports that arrive in Mali during the months of June to December. The European potato market is very competitive, with the Dutch currently the most efficient producers. They are capable of delivering potatoes to Bamako at a wholesale cost of 350-400 CFAF, year round. Once the Malian crop is exhausted then they are the competitive price to beat. The additional costs incurred for storage must still make the final price less than or equal to the imported potato wholesale price.

Traditional storage conditions do not allow for the harvested potatoes to be stored for more than a few weeks or at most two months, after the potatoes are harvested in January through March. This method therefore does not offer a viable solution to the medium-term storage issue.

In light of this, several experimental (improved) storage facilities have been constructed using donor funding. These experimental buildings offer the possibility to store potatoes at lower cost than cold storage but will not have the reach of one-year's storage that is possible with cold storage. Since these methods are still under experimentation and no detailed cost data is yet available (outside of construction costs), it is not possible to make a detailed financial analysis. It does, however, look promising, especially the 250 MT capacity storage facility under construction in Sikasso. The village level storage facilities are smaller, with 37-50 MT capacities. This is sufficient for most villages, especially if there was a larger central warehouse

¹⁷ According to "OMA" a total of 1,877.34 MT of potatoes were exported from Mali from January to June 2006.

in Sikasso. In that case the village storage facilities could serve as feeder system for a set of approximately four central warehouses.

If the technology proves effective and the cost can be kept to a minimum (outside of the initial construction costs) then stock financing, using a warehouse receipt system, could significantly increase profit margins to the producers, provided these structures were managed through a growers' cooperative or association arrangement.

It is unlikely that the storage period could be increased much beyond July or August; however, the simple increase of two or three months would correspond with the period when the price of imported potatoes averages between 350 – 400 CFAF per kilogram delivered to Bamako. This would translate into a 100 – 150 CFAF premium per kilogram to the producers, minus, of course, the storage and handling costs.

GENDER ISSUES

Potato producers are almost exclusively men, although it is possible that there are a few women producers in the Katibougou/Koulikoro regions. This is due to the fact that potato production is an important cash crop and, in the case of the Sikasso region, it has been a significant potato producer for more than forty years.

Women, however, almost exclusively conduct retail marketing of potatoes. Men are still involved as wholesalers but women are the retailers that are found in all of the market places throughout Mali. This is likely because the perceived margins are not great and thus of little interest to men. They have no financial incentive to set up their own market stalls. This is unlikely to change in the foreseeable future.

MARKET INFORMATION

“OMA” collects and broadcasts weekly potato market price information on the radio for a limited number of the primary domestic markets. It further had an agreement with the USAID/TradeMali project to collect and broadcast price information on potatoes (as well as other commodities) from neighboring countries, such as Senegal, Guinea, Côte d'Ivoire, Burkina Faso, and Niger. It was not clear in discussion with growers if this information was helpful in making production decisions, in promoting exports or even if it is even considered useful at all.

Potato grower associations and individual producers typically fail to coordinate production quantities, harvest timing, and sales. Each individual tries to sell his production for the best price he can get without associating his fellow producers. This means that the buyers set the price and the producers can take it or leave it. They accept it of course because they know that someone else will take their place if they do not, especially since the “need the money now.” Better horizontal integration among the growers would significantly increase incomes, even without use of a moderate level of storage. Commercial linkages with wholesalers in neighboring countries would encourage producers to use the price information available to make better harvest and storage decisions.

This will not be possible until well-managed and transparent growers' cooperatives and/or villages associations replace the current dysfunctional structures and unreliable leaders. Rather than trying to be 100% inclusive, these associations should accept only those individuals that can and will comply with their by-laws and regulations. Strong penalties must be applied to those who violate these agreements, especially in terms of financial benefits; i.e., production credit and sales premiums from storage only for the good members.

FINANCE: CURRENT SITUATION AND OPPORTUNITIES

Up until the 2005/2006 production season, individual credit through producer associations (solidarity group guarantee) was widely available for potato growers in the Sikasso region, primarily through BNDA and Kafo Jiginew. A minor amount of individual credit was also available from the input suppliers for any remaining seed potatoes that were not financed by the banks or Kafo Jiginew. One input supplier estimated that this was less than five percent of total imports; however, it is doubtful if the amount ever exceeds one or two percent of imports. Total input finance exceeded one billion CFAF during the 2005/2006 season.

Unfortunately, reimbursements from the 2005/2006 season are still outstanding. For example, of the almost 184,000,000 CFAF in loan principal disbursed by BMS in 2005, 34,499,000 CFAF is still outstanding, more than a year later. The situation is even worse for BNDA and Kafo Jiginew. This issue is even less understandable from a financial perspective because both the quantity produced and the average selling prices were very good last year. From the banks' perspective the producers are at fault and simply refused to repay their loans.

The situation is much more complex than this simple assumption that the producers are dishonest. First of all, the amount of seed potato available for the 2005/2006 season was about 30-40% greater than in previous years. Second, the financial institutions did not do the same level of due diligence as in previous years. This allowed unscrupulous individuals to get credit, when they would not have previously qualified, and encouraged producers to take more seed potatoes than they had either the financial capacity or available family labor to produce effectively.

Third, the grower associations made no effort to prevent known unreliable individuals from obtaining credit under the group guarantee nor did they limit the amount of seed potatoes taken by certain individuals, even though they knew that they could not manage those amounts of seed potatoes. Fourth, individual who took too much seed potatoes gave them out indiscriminately to relatives and friends who lacked both the technical skills and resources to grow the potatoes. In most cases this distribution was viewed as a gift from their friend or relative. Once those members did not produce, the actual borrowers realized that they could not repay the total loans out of their actual production and decided in many cases not to pay at all.

Fifth, the expected level of supervision by a Malian NGO never occurred. In fact, the level of income that the NGO receives for loan repayment supervision is not sufficient to cover actual operating costs and only occurs after full reimbursement. This makes it difficult for the NGO to provide the level of supervision that is really needed and thus led to limited follow-up and poor information dissemination on repayment problems back to the financial institutions.

Finally, during the follow up on delinquent payments, the financial institutions indicated that no one would get input credit the following season if the entire producer association did not achieve at least an 80% repayment rate. This further discouraged those who wanted to and could repay, since they knew that many of their producer association members were not going to pay on time. It is likely that some of these individuals therefore decided not to continue repayments so that they would have cash to purchase inputs during 2006/2007 production season. The unwillingness of the financial institutions to distinguish between the "good payers" and the "bad payers" made the situation even worse.

In light of these problems, input credits for the 2006/2007 season were severely reduced. One bank, BMS, refused to grant any further input credit for potato production. This translated into a 55% reduction in seed potatoes availability and access to credit for less than 20% of the producer associations available.

Instead of looking to distribute blame at this point in time, the value chain actors need to work with the financial institutions to put in place a strategy to rebuild the confidence in the sector that is needed to return to the previous level of production. This can only happen if there are incentives for the good payers and continued penalties for the remaining delinquent producers. The financial institutions must make the highly indebted “leaders” pay if they expect the ordinary producers to pay. Producer associations need to be more exclusive (good producers only) rather than continuing to operate with an all-inclusive policy for village members.

CONCLUDING OVERVIEW

There are significant opportunities to expand potato production in Mali, both in terms of meeting increased domestic consumption and for export to regional countries. Focused interventions can improve the value chain productivity in four critical areas. These are:

Improvement of the input supply process to ensure that the most appropriate quantity and quality of fertilizer and pesticides are available, in addition to seed potatoes.

Efforts need to be made to integrate the technical know-how that is available through the research institutions to make a more cost effective package available to the producers. This would include more communications with and among the seed potato suppliers, as well as with the national agricultural support institutions.

Improvement of relationships with financial institutions through discussions (in Sikasso) between the financial institutions (banks, MFIs), the seed suppliers (Sikassoises, InterAgro and Cikelaw Jigi) and the growers (village groups, cooperatives, individual producers). These discussions need to focus on rebuilding confidence among the participants throughout in the lending process.

A mutually agreed upon road map, including time-specific benchmarks, needs to be put in place to ensure that the better growers (those that pay on time) get access to the necessary input and the production credit required to produce an optimal amount of potatoes for the 2007/2008 season.

This should include a full review of the input credit terms and conditions to ensure that the payment structure accurately reflects the actual cash flows from potato production (perhaps smaller, multiple installments would be better than one lump sum payment). The financial institutions should consider offering different rates and conditions to better borrowers (lower rates, less restrictive conditions, etc.) and than those offered to the less “trustworthy” borrowers (higher rates, more restrictive conditions, etc.).

The producer groups should look into creating mutual guarantee funds, similar to those currently used by Faso Jigi for rice production. These guarantee funds would be capitalized by retention of a small percentage of the sales price of the potatoes marketed through the associations. These funds would be deposited with the financial institutions, as fixed term deposits as collateral, thus lowering risk and increasing confidence of the lending institutions.

Development of effective horizontal integration among the producers for harvesting, storage, and marketing of the production.

These producer organizations need to focus on those individuals that willing to work together and respect the terms and conditions of their organizations. There needs to be real monetary incentives (higher prices, easier access to inputs, etc.) for good members to market together and enforceable penalties (exclusion, lower prices, no access to joint sales premiums, etc.) to for those that violate the agreements (side selling).

In addition, the leadership must set a real example, especially in loan repayment, or they should be held accountable for poor management and excluded from those leadership positions. Transparent management is essential to provide the right incentives for members to participate in the leadership process.

Finally, improved and cost effective potato storage facilities need to be developed and linked to a warehouse receipt system to allow the growers to sell their crop at a reasonable price at harvest time (to meet household cash needs) and still allow those same producers to receive a premium from the later sale of the stored potatoes, when the price increases in June, July and early August.

Table 6: Potato Value Chain Analysis: Review of Participant Dynamics

	Input Supply	Production	Storage	Marketing and Sales	Wholesale	Retail
Integration	The number of suppliers is very small (4); however, there is active competition among those in Sikasso, while the supplier in Katibougou has a monopoly	Large number of growers with a large potential for horizontal integration, most effective for input supply and production credit	Very little improved storage available and thus no horizontal or vertical integration is possible	There is little horizontal integration among growers, who compete with each other to sell their production at the same time. There is currently one attempt at vertical integration by a producer's association	The semi-perishable nature of the crop and lack of cold storage facilities precludes horizontal integration among wholesalers, who want to get their product to the retailers as quickly as possible	Little integration for a large number of small, female retailers. There is no horizontal integration of storage facilities to facilitate bulk purchasing
Governance	Small family-run companies, no governance issue	Significant governance issues given that the producers are poorly organized and eager to sell	No dominance with intermediate handling, limited storage is done on an individual basis, does not last long due to risk of spoilage	Free market but urgency of producers to sell their production quickly gives price advantage to wholesalers	Buyer led for sale to retailers	Free market due to the multitude of retailers and options available to the consumers

	Input Supply	Production	Storage	Marketing and Sales	Wholesale	Retail
Market Information and Linkages	Telephone & internet access to international market information, two have exclusive import agreements with European exporters	Lack of information on global and regional prices, poor circulation of domestic price information although it is available on the radio	Few formalized linkages between the individual and producer associations to store production	Weekly price information available via radio for major Malian market towns and some neighboring countries but little or no communication with bulk purchasers. Trucks come to the weekly markets to purchase or in some cases intermediaries are employed to bring together enough product to fill a truck	Weak informational linkages between the producer organizations; the wholesalers and growers operate individually, opportunity lost for group pricing	Open and free communication. Large number of points of sale and prices openly negotiated
Gender	The seed potatoes suppliers are all male run companies	Producers are almost exclusively male	Male dominated for the three improved storage sites visited	Generally male dominated at the producer and wholesaler level	Male dominated	Exclusively female for retailing in market places
Financing	Formal credit is available to the input suppliers, 3 through bank letters of credit and 1 through an MFI loan	Individual credit through BNDA, previously BMS and MFIs, with a group solidarity guarantee	No formal credit available at this time	Full cash payment expected at time of sale in rural areas, limited organized sales through a producer association supported by an initial donor subsidy	No financing between the buyer and seller	Seven to ten-day credit is often available between wholesalers and retailers, some MFI financing may occur for market retailers

RICE VALUE CHAIN

Rice is a crucial foodstuff for Mali. Rice production in Mali is five times higher than it was 20 years ago (annual increase of nearly 8 percent) and in 2005 was 1.053 million MT of paddy (about 685,000 MT of milled rice). The value of rice is estimated at approximately one fifth of total agricultural production. Production has been growing rapidly and the long-term outlook is for large expansion of demand for rice in the region. Mali has excellent opportunities to improve productivity and to expand knowledge about and access to regional markets. If Mali fails to take advantage of its reputation of high quality and fails to develop regional markets, within a few years it is likely to face excess supply and difficulty in competing with imported Asian rice.

Farmers generally do not rely completely on rice for their income. Rice is grown mainly in the rainy season under irrigation. Rain-fed millet, sorghum, and corn are grown at the same time and the three form the main source of food for farm families. Livestock are also held by many farmers and represent an important source of income. Thus, rice is crucial to family income but is not the only source of income. The *contre-saison* vegetable crop may be as valuable as the main season rice crop in areas where double cropping is possible. One estimate says 20 percent of Office du Niger farms produce rice or other crops in the *contre-saison*, in addition to the main “hivernage” season crop. Office du Niger officials say that it is preferable to produce crops other than rice that use less water outside the main season, and such crops often produce higher revenue than rice in the *contre-saison*. Double cropping is also common in the more humid areas of southern Mali around Sikasso and in a few other irrigated areas. In the most productive zone, under the Office du Niger, officials indicate that farm families consume about 30 percent of their rice and sell the rest.

For local producers of Malian rice, entry into production is not easy, because of scarcity of irrigated land and the high expense of developing and maintaining irrigation systems. However, there is substantial room for boosting productivity on existing farms by improving cultivation practices and increasing yields/hectare on existing rice farms. There are continuing attempts by donors (the US, the EU, France, the World Bank and others) to make major new investments to expand irrigated rice area planted. Malian rice producers face competition from substantial inflows of low-quality Asian rice that is often cheaper than Malian rice. Nevertheless, Malian rice has a taste preference among many consumers and thus far Malians do not seem to have much difficulty selling their rice.

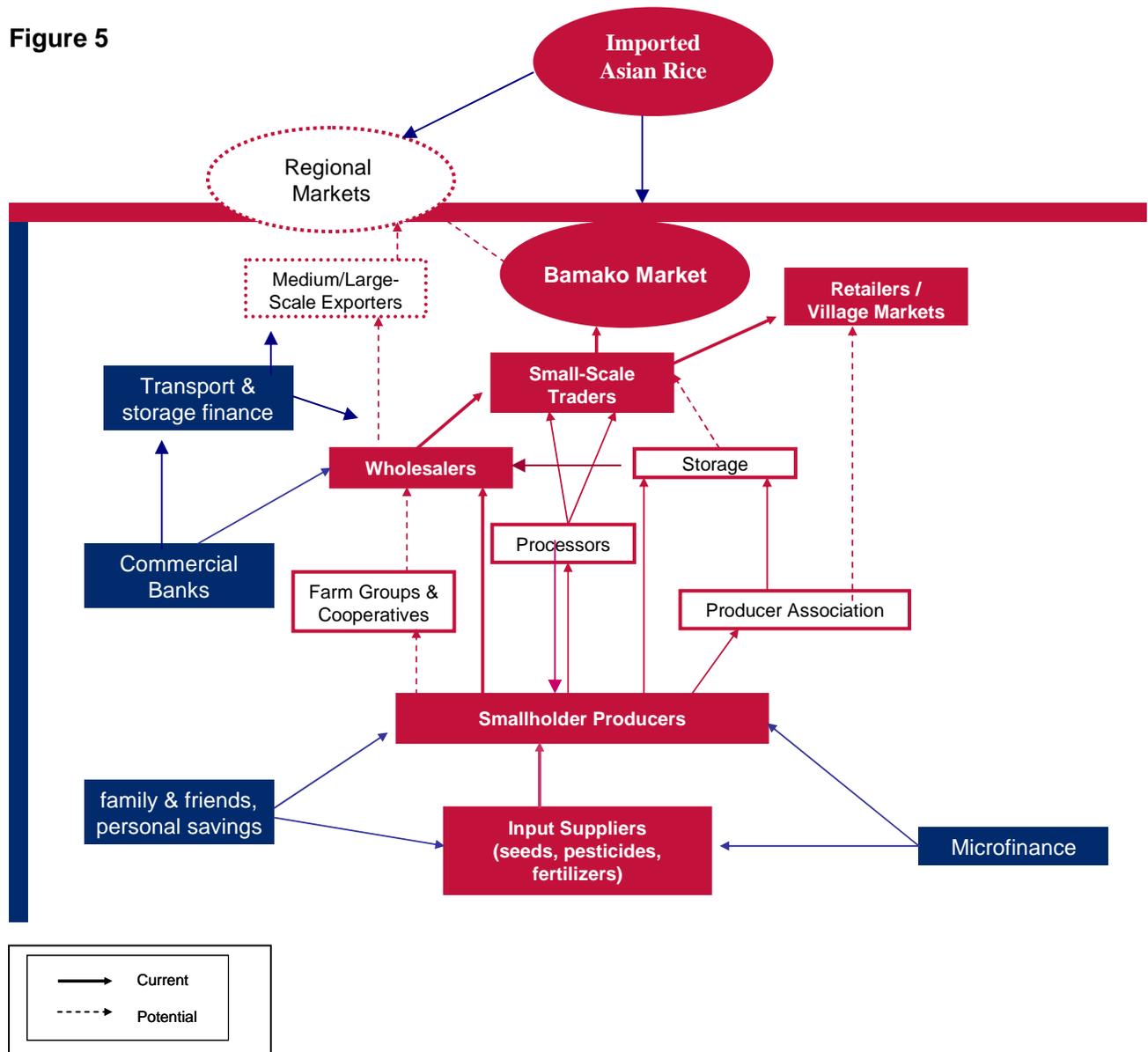
KEY CHARACTERISTICS, RICE

- All rice varieties are for flood cultivation, mostly through irrigation.
- Farmers have different production systems. Where water availability is fully controlled, they can transplant and obtain yields of about 3 times higher than in other areas.
- The buyers dominate the rice value chain. Price is influenced by the low price and availability of imported rice.
- Sellers so far are price takers.
- Malian rice seems to be preferred by consumers over imports and has not experienced many problems thus far in marketing
- Rice production has increased to five times its level of 20 years ago.
- Fewer than half of Mali's farmers maintain the recommended best practices.

- Rice production could be increased dramatically with better practices.
- Credit is available for inputs, but credit cost is high.
- More medium term credit is needed for processing equipment and warehouses.

Following is a graphic representation of the rice value chain: This shows some of the financial flows and the different levels of activity from input supply to cultivation, to processing/storage/wholesale and retail markets. Later on we will discuss availability and cost of financing and other logistics and marketing considerations.

Figure 5



INPUT SUPPLY

Planting inputs include the following:

Seeds: High yielding seeds need to be changed every three years for good yields. The Institute for Economic Research (IER) develops or approves the appropriate varieties and the Government's Seed Service arranges for multiplication with selected farmers in the seed producers associations. There are five zones for different types of seeds. The technology is transferred to the farmers as an embedded service when they purchase the improved seeds.

Herbicide is often used prior to planting – common in Office du Niger (ON) area of Segou and Niono. The Office du Riz in Mopti says about 30 percent of their farmers use herbicide.

Fertilizer is needed for all rice producers, mostly chemical fertilizer on rice and some manure, although manure is more commonly devoted to *contre-saison* vegetable crops. Government authorities (Institute for Economic Research), and donors provide recommendations on seeds and agrochemicals to use. European companies also provide information, testing, and certification on chemicals. This technology is transferred through the distribution system for inputs. There are also pamphlets produced in local languages on cultivation methods. But the extension system is not fully effective in getting information to rice farmers and fewer than half of them use all the recommended cultivation practices.

Farmers in the Office du Niger area produce nearly half of the country's rice and after a horrible reputation through the 1970's, ON has withdrawn from marketing and has been withdrawing from influence on purchasing inputs. Purchase of inputs is done by groups of farmers passing requirements through producer associations for joint tenders, with financing by banks or microfinance institutions. There are reportedly about 15 to 20 suppliers of imported fertilizer, seeds, herbicides – and several firms are often given parts of the tender award to supply large quantities of inputs for rice.

Fertilizer use: The Central Bank has indicated that that short term agricultural bank credit in 2006 exceeded 100 billion francs in September 2006, falling to 44 billion francs in December. About three quarters of this was for cotton, and most of the rest for grains, though there was no breakdown among rice, sorghum, corn, and millet.

If farmers had used recommended amounts of fertilizer on rice, this might have led to use of an average of 150 kg/ha of urea and 100 kg/ha of DAP on Mali's 409,000 ha of rice in 2005. That would have implied using 41,000 MT of DAP and 61,000 MT of urea (Nitrogen) with a price to farmers totaling roughly 30 billion Francs CFA (about \$60 million). Probably not more than half of that amount was actually used on rice. The national rice crop had a farm gate value of roughly 137 billion francs or \$279 million (130 cfa/kg of paddy). Production would have been higher if more improved seeds and fertilizer were used. More advice through extension and expanded credit availability could have much potential to increase yields.

* Retail fertilizer price to farmers in March 2007 was 260/kg DAP 290/kg. Herbicide use is reportedly fairly modest – 12,000 to 14,000 liters for the entire country.

Table 7: Cost for fertilizer, March 07

	Improved areas	Non-Improved areas	Price 3/07
Urea	195 kg /ha	169 kg	260 CFA/kg
DAP	120 kg	97 kg	290 CFA/kg
FO (manure)	1 858 kg	2 195 kg	much from own animals

	Improved areas	Non-Improved areas	Price 3/07
Seed	76 kg	73 kg	240 CFA/kg

In areas where the water supply is less certain (e.g., area around Mopti), farmers may broadcast seed – requiring more per ha – perhaps 100 - 120 kg. They also may use less of the expensive chemical fertilizer, which can burn the crop if there is inadequate water after application. Assuming the manure use might be without a cash outlay – from the farmers’ own animals, the cost of the main purchased rice inputs for the entire country under ideal conditions would be:

Table 8: Input costs if recommended quantities used (estimate of average countrywide):

Urea	150 kg x 260 x 400,000 ha	=	15.6 billion CFA
DAP	100 kg x 290 x 400,000 ha	=	11.6 billion CFA
Seeds	80 x 1/3 x 400,000 ha x 240	=	2.6 billion CFA
	Seed cost	=	220 – 245 cfa/kg (need 70 – 125 kg/ha)
	Total cost of seed and fertilizer for rice	=	29.8 billion CFA

PRODUCTION

With fully controlled irrigation systems, farmers get over 6 tons/hectare in the 67,000 hectares cultivated in the rainy season in the Office du Niger area. Office du Niger farmers produce 11 percent of their annual rice harvests (an average of 4.8 tons/ha) in the secondary season (*contre-saison*). The two harvests of the Office du Niger constitute nearly half of the country’s rice production. Some other fully controlled irrigation areas get 5 MT or so per hectare. Fully reliable water control characterizes production in most of the 80,000 hectares of the Office du Niger, in Baguineda (3000 ha) and in Selingue (800 ha) as well as in limited areas where there are pumps for irrigated perimeters (small areas in Mopti, plus larger areas around Timbuktu and Dire). In less favorable conditions such as the 116,900 ha of partially controlled irrigation and the 8,100 ha of Bas Fond (rain fed catchment areas), most farmers typically get 0.5 to 2 MT per ha.

Payment of annual fees for irrigated land (all land belongs to the state) in March forces many farmers to sell their rice or vegetable crops earlier than they might otherwise sell, and could lead to a dip in market prices. Recently, 5,000 farmers were reportedly evicted from Office du Niger rice growing areas for non-payment of the annual fee. After an appeal to the Prime Minister, most of them were reportedly allowed to pay the fee and return to their land.

IER (Institute d’Economie Rurale) – gives advice to farmers and sometimes publishes crop information in local languages. IER develops high yielding seeds and gives them to the seed service, which contracts with private farmers for multiplication of seeds for sale allocated by five seed zones. A number of donor organizations have also been working with farmers in the diverse rice growing areas.

Farmers in most cases harvest plant and harvest rice by hand and the rice is threshed and milled by machines belonging either to the village or privately owned. Rental cost for land is 67,000 cfa/year in the best Office du Niger areas – lower in areas with less expensive infrastructure.

Almost all farmers in improved areas of the Office du Niger seem to be transplanting rice, which helps to greatly increase yields. They are less diligent about cleaning canals and drainage canals for optimal water use and crop results. Many of the farmers in the best areas regularly use improved seeds. Use of improved seeds is less common in other areas. All over the country there is potential for much higher production on existing land, and limited potential for expanding area. A very expensive prospect of lining canals will be required if area is to be expanded very much in the major irrigation systems such as that under the Office du Niger. At present, donors do not seem enthusiastic about the massive investment this would require in the system as a whole, although some large individual projects are being undertaken (e.g. plans to develop 16,000 ha of irrigated rice 81 km from the Niger by Millennium Challenge Corporation).

Table 9: Major characteristics of the different irrigation systems in Mali

Irrigation System Type	Place/ Characteristics of production
Full control canals	<ul style="list-style-type: none"> ○ Segou, Niono, Baguineda, Selingue ○ Water is built up behind dam and can be released at different dates ○ With good management – yields are 6 to 8 tons per hectare ○ Very heavy initial public investment ○ Two crops possible but excessive water use ○ Need to clean water of hyacinth and other weeds and debris ○ Canal cleaning recently shifted to farmers: slow to accept ○ Land must be leveled using <ul style="list-style-type: none"> ○ Tractor (rare) ○ Hand motorized tiller (increasing) ○ Animal traction (most common method) ○ Ideally: line canals for water conservation (rare) ○ Need water evacuation canals for harvest ○ Use of best inputs – <ul style="list-style-type: none"> ○ High yielding seeds replaced every 3 years ○ Herbicide ○ Transplant seedlings (labor cost 47,000 cfa/ha for women to transplant seedlings from nursery) ○ Imported fertilizer (possibly local manure as well)
Irrigated Perimeters	<ul style="list-style-type: none"> ○ Timbuktu area (2,000 ha), Mopti Area (1,300 ha) ○ Yields 5 MT/ha likely with good management ○ Two crops possible ○ Need excellent inputs ○ Transplant seedlings for high yields ○ Need system to maintain irrigation pumps

Irrigation System Type	Place/ Characteristics of production
Partial control	<ul style="list-style-type: none"> ○ Mopti (33,800) ha, Segou (34,100 ha), DAD Project Djenne (49,000 ha) ○ Danger of flood failure every 3 to 5 years ○ Yields may be 1- 2 MT/ha ○ Farmers don't want risk of high investment ○ Don't transport seedlings ○ Don't invest as much in inputs
Bas fond (low lying water catchment areas)	<ul style="list-style-type: none"> ○ Sikasso total bas fond area large and small 8,100 ha.
Small bas fond	<ul style="list-style-type: none"> ○ Yields as low as 0.5 MT/ha – with improvement 2 MT ○ Some excellent net returns without much investment. ○ Farmers have alternative claims on their labor during rainy season. ○ Cultivation can be improved with small dams for better yields and other modest improvements in cultivation: – e.g. purchase of seeds, planting in rows instead of broadcasting ○ Gender issue: Will men take improved lands away from women cultivators? Most rice is sold and consumed in the Sikasso area.
Plain Bas Fond	<ul style="list-style-type: none"> ○ Opportunity with good management and investment in water control up to 5 MT/ha. ○ Good opportunity for investment. Water fairly reliable.
Recession cultivation	<ul style="list-style-type: none"> ○ Timbuktu area (plant rice when water recedes). ○ Yields about 1 MT/ha ○ Rice deficit area. Not really an irrigation system

A USAID-financed study in 2002 suggested additional investments as follows:

Table 10: Suggested Additional Investments, 2002

Region	Suggested Improvements
1. Segou/Niono	<p>Improve 100,000 ha of controlled flood land to get 1 MT more per ha. (costs \$250/ha).</p> <p>The study bemoaned the tremendous waste of water in the Office du Niger zone, with over half the water lost by seepage and evaporation before reaching the third tier canals. It recommended improving existing farms rather than extending a system which is very wasteful of water.</p>
2. Sikasso	<p>Improve small bas fond rice – cost \$800/ha for 9,000 ha for 1 MT more of rice per ha and perhaps an equivalent value of vegetables in the contre saison</p>

Region	Suggested Improvements
3. Sikasso	Improve 3,033 ha of plains bas fond for \$4,250/ha for to get 3.5 MT/ more per hectare.
4. Mopti	Convert 2,250 ha to total control at a cost of at 19,800 dollars/ha for an average annual increase of 4 MT/ha.

SALES AND COMMERCIAL DISTRIBUTION

Farmers sell directly to middlemen or to their producer associations. A common method is for a buyer to send an agent on a motor scooter to the farm to make the deal and then send a truck to pick up rice from farmers to deliver to a warehouse in the town.

In some cases, producer associations have warehouses where the rice is stocked, still owned by the farmer, or alternatively sold to the producer association with partial payment to the farmer before onward sale and the balance coming to the farmer after the sale. This could involve credit from a micro credit institution through a village cashier, with a fee paid to the producer association to cover its expenses and build up its capital. The quality of rice varies by the cultivation method (whether it is planted and harvested on time) and how dry it is (it breaks in milling if it is too dry) and the machinery used to decorticate it (the small machines commonly used are inexpensive, but produce many broken kernels).

Import data are somewhat uncertain. FAO data for 2004 showed less than 40,000 MT of rice imports and seem to be incorrect. US Department of Agriculture worldwide data show 150,000 MT of rice imports into Mali for 2004/05 and 125,000 MT for 2005/06. A major importer in Bamako suggested that imports might be even larger. One report estimated exports to neighboring countries (Mauritania, Burkina Faso) of about 50,000 MT of Malian rice. While import figures are somewhat uncertain, it appears that Mali imports roughly 20 percent of its rice consumption needs, generally very low quality rice from Asia.

Asian rice imports come mostly by truck through Abidjan, in spite of civil disturbances there, and USDA projections predict huge increases in African rice imports over the next decade. This implies good opportunities for Mali to increase production and sell at a profit within Mali and in neighboring countries. Exchange rate changes of the Euro/CFA versus the dollar could have a major impact on future competitiveness. At present it appears that the wholesale price of imported rice is about 5 percent cheaper per kilo than local rice in Bamako. One trade source indicated that there is no major problem shipping Bamako rice from Abidjan in spite of unrest in the country, although a police bribe of 250,000 cfa (“taxe sauvage”) is required for the 30 to 60 MT trucks plying the route (4 to 8 francs/kg). If Malian rice were shipped to Abidjan, it would be about 20 to 30 percent more expensive than imported rice. Contacts indicated that Malian rice tastes much better than the low quality rice imported from Asia, but said that the Asian rice absorbs more water in cooking, and could feed 10 people compared to 7 for the local rice. Thus, very poor people or those who don’t know rice qualities very well tend to prefer the imported rice. It is unclear whether people throughout the region will agree that Malian rice tastes much better than the Asian rice commonly imported into Mali.

Table 11: Key prices quoted in March 2007 for the Bamako market

Item	Price
Farm gate price for paddy (unmilled) rice	120 to 140 cfa/kg
Wholesale price for local milled rice	250 cfa/kg
Wholesale price imported rice	235-240/kg
Bamako retail price: local rice (whole kernel 300 cfa, 100% broken 250 cfa)	275/kg
Bamako retail price: imported rice (normally 10 cfa less than local rice)	265/kg
Approximate trucking cost/kg	Niono to Bamako: 10 cfa Mopti to Bamako: 15 cfa Abidjan to Bamako: 20 – 25 cfa

PROCESSING

Rice is harvested by hand and put in stacks for threshing. It is machine threshed and then machine decorticated. In the best instances it is also polished by a machine and sorted by grain size in a machine but this is rare and can be done either near the production area or at the end market. Rice is usually sold in 50 kg sacks.

Farmers need to use machinery, most of which is owned by others. Draught animals are used instead of tractors, though there are a few tractors and motorized hand tillers in the country. Machinery includes threshers, which many villages use to separate the grain from the stalk after hand harvesting. In addition there are many small decortication machines to mill the rice – removing the hulls and the bran. Some of the big rice mills went out of business after the mills were privatized in the 1990's. Now three large rice mills remain, milling about 25,000 tons out of the 1 million ton rice harvest. Little individually owned rice mills are numerous and some entrepreneurs take mobile rice mills from village to village to decorticate rice for a fee. Milled (white) rice is up to 65 percent of the weight of the paddy in a good mill, sometimes considerably less in a small mill. The farmers use the hulls and bran to feed their animals. Usually, the farmer pays to mill the grain and keeps ownership of the rice and the hulls.

Larger machines (4.9 million CFA) are small enough to be purchased by individuals, and could do a much better job. Polishing and sorting machines are also available to produce high quality products, but are not widely used. Investors have to sort out to what extent improved rice milling might outweigh the additional cost of taking the rice to the mill and then having to

transport the bran and husk (animal feed) back to villages after the rice is milled. Paddy rice is not as good quality if not planted or harvested on a timely basis. Rice may become too dry, resulting in breakage when milled. Milled rice in bags can be stored for many months.

In export markets, Senegalese consumers reportedly are willing to buy broken rice, but others such as those in Guinea, prefer whole kernel rice. Some parboiled rice was produced in Mali for neighboring markets but the quality was reportedly very poor and not well accepted. There doesn't seem to be any problem so far in selling local rice. The broken quality looks terrible to a western eye – but Malians prefer the taste to imported rice, even when the local rice is a little more expensive. Some rice is exported to neighboring countries – quantities unsure, but perhaps 50,000 tons. Rice has become particularly more popular in urban areas, but is also consumed more and more even in rural areas such as the Dogon Plateau and areas to the north – Gao, Timbuktu.

QUALITY PREMIUM: Most Malians seem to prefer the taste of local rice to imported rice. But the imported rice is cheap – sometimes cheaper than local rice particularly after considering that it swells more and feeds 40 percent more people. People say that imported rice is old and doesn't taste as good. Some of them even prefer the broken rice – it absorbs more sauce and is tastier, though it is more difficult to find and remove small stones in broken rice before cooking.

Rich Malians do pay a premium for whole grain local rice after machine sorting. One small merchant in Bamako said the retail premium for unbroken grains is about 25 francs/kg. – or about 9 percent. Education, promotion, packaging, and branding could lead to a higher premium. Organization through farmers' associations could lead to better harvesting and milling techniques to produce for a high quality market and branding.

Note that the more than 30 percent appreciation of the Euro/CFA against the dollar in the past few years has had an impact on the competitiveness of Asian versus Malian rice. US Department of Agriculture projections show huge increases in already substantial rice imports into Africa in the future. Mali is likely to be a surplus producer and could benefit from this increased demand in other countries if its rice is competitive.

To reinforce and expand the quality premium, Mali will need to produce high quality rice, which could mean full kernel, branded rice, possibly including small packages (2 to 5 kg). Options to produce better rice include purchase of a good quality 4.9 million CFA mill instead of the 3 million CFA mill). With better production techniques, Mali could continue its average increase in rice production of nearly 8 percent annually, outpacing population growth and exceeding local consumption within about 4 years. Reductions of production costs, a more favorable exchange rate, or normal market changes could make Malian rice more competitive. For example, if farmers were able to get lower interest rates, and/or logistics were made more efficient, costs could decline. But in any case, it is wise to take full advantage of the quality advantage in regional marketing. Such a premium is most likely to be available in cities, including cities on the coast.

MARKET INFORMATION OPPORTUNITIES

There is substantial need for more farmers to be convinced to use the recommended cultivation practices for their fields. They do not have to understand the genetics of the seeds they purchase or the chemical composition of the fertilizers and herbicides but they do need to know how to prepare their fields and irrigation canals and how and when to plant the seeds. If they are in a fully controlled irrigation area, they may want to coordinate with a crop calendar so that labor needs for transplanting and harvesting are staggered. If they are not in a fully controlled

water system, they may need other advice, such as planting in rows instead of broadcasting seed.

Major opportunities exist for better information on selling and transporting products. Retail price data are already being collected by the government and are being circulated. If in addition, there were a general agreement on grain standards – e.g. how many brokens per hundred, size, color, and several grades could be established, this would facilitate pricing from afar. A merchant in Bamako or even Conakry, knowing current prices in major markets, could contact a trusted merchant in Niono and arrange for a purchase. The merchant in Niono could have a trusted relationship with local farmers, agree on a price and quantity, and have a truck sent to pick up the agreed commodities.

Trucks could be used more efficiently on longer hauls. A merchant in Niono could have a computerized listing of truck availability perhaps within one or several companies. Freight could be booked on trucks in both directions and prices agreed in advance. Possibly a GPS system could be used to track trucks and identify breakdowns or other problems. Arranging backhauls could reduce transport costs. Management of warehouse stocks could also be more efficient.

If there were good warehouse systems, commodities could be stored under trusted control and bank financing could be arranged based on warehouse receipts. Eventually, if grades were very reliable, grain could become fungible – so that a warehouse would not have to identify preserve specific sacks. Bulk handling, shipping and storage is another possibility for the longer term, but could work well with the three large rice mills.

Another key aspect of information systems is credit. Some groups have a record of 98 to 100 percent payment. If a financing institution were relatively sure of payment and if transactions were fairly large, interest rates could be reduced. Good records on borrowers and on performance of groups and members of groups could permit more financing – including more financing of machinery (such as threshers, high quality mills, warehouses, etc).

Improving communication among the different members of the value chain could increase confidence, reduce interest rates and other costs, and result in higher profits for farmers and intermediaries. More certainty in the marketing system would also facilitate development of high-quality branded and retail packaged products for mid- to high-income segments of consumer markets. This could be particularly important in developing trade to neighboring countries.

FINANCING

There are a number of large banks in Mali. Only three of them provide substantial financing for the agricultural sector. There are also a number of micro credit institutions, which deal with directly with farmers. The main ones are Kafo Jiginew, Nyesigiso, Kondo Jigima, CVECA's and CANEF.

Here is the typical financing for input credits for rice in Mali for agrochemicals:

1. Importer purchases from Europe, sometimes with letter of credit from a European affiliate company for which the Malian may be an agent. The importer may get supplier credit – possibly as low as 6 percent interest (estimate based on current European interbank lending rates of 4.13%), though the team did not get specific information on credit costs for importers.
2. A producer association groups needs of farmers and arranges joint tender for input suppliers (other than seeds, which come from the Institute d'Economie Rurale and the national seed service)

3. Some producer associations charge fees to farmers as they sell their rice and use that money to guarantee loans for the next season. In the most developed rice production areas, producer associations pass their needs for fertilizer to a central group, which in turn announces a large tender to get offers from 15 to 20 suppliers to provide the products required. Technical assistance from NGO's or from government-linked organizations is required for product and tender specifications.

4. Financial institution provides credit to individual farmers (sometimes with a guarantee from a producer association). A common interest rate is 2 percent per month for about 7 months (annual equivalent 24% interest).

Credit is often available – either directly from the BNDA, BMS or Ecobank, or through the micro credit system, which may raise interest rates from 10 percent effective interest the microfinance institutions may pay to BNDA to effective interest rates of 20 to 25 percent for the farmer. Banks often choose to put a good deal of their funds in relatively risk free government paper, paying 4 percent instead of going through the risk and substantial administrative cost of lending to farmers or farm groups. Micro credit institutions interact directly with farmers, but must charge high interest rates and related fees to pay for the risk and high transaction costs of dealing with thousands of farmers and arranging the mechanics of loan disbursement, monitoring, and repayment. There is also a considerable amount of supplier credit – e.g. wholesalers in Bamako sometimes provide credit to retailers for a few days.

Micro credit institutions began in the 1980's and 1990's to build direct contacts with farmers as large government organizations stopped arranging for input purchases. The micro credit system is still evolving and currently gets some of its financing from banks and most of its financing through deposits. Micro credit institutions may pay about 3 or 4 percent on deposits (zero for some mandatory deposits) and up to 6 percent for large, long-term certificates of deposit. One large micro credit institution told the team that they pay an effective interest rate of about 10 percent for a five-year loan from a bank.

There is also credit through cooperatives and other associations and almost all farmers are members of one of these associations. Most commonly, a loan for crop inputs is made to an individual, often by a microfinance institution, but the farmer group guarantees repayment of the loan. If the association fails to pay, it and its farmers may be denied credit the next year. There were reports of some problems of non-payment in Segou and in Sikasso last year. Payment experience can vary year by year. Sometimes microfinance institutions get 98 percent repayment. Last year, however, due to some problems in Sikasso, and reportedly due to questions on fertilizer prices in Segou, non-payment reportedly reached about 15 percent of outstanding loans for agricultural credit from banks, a factor which may tend to justify the high interest rate spreads.

Farmers need financing for inputs. Additionally, farmers and other value chain actors also need financing for machinery and for working capital to hold commodities. The lowest bank interest rate on a loan is probably 10 percent – the effective rate for which one of the micro credit finance institutions borrowed money from a bank. A large industrialist might be able to get a similar rate of 10 percent (one industrialist mentioned lower nominal rates of 6 to 10 percent, but this probably did not count the deposits and other requirements that raise the effective interest rate). A wholesaler in Bamako told the team that banks were offering inventory financing at 16 percent. A small rice miller in Niono told the team she got a 5-year loan at 15 percent. In sum, it appears that a borrower with substantial assets could borrow money at 10 to 16 percent for equipment, or for working capital to hold commodities in storage. Farmers would have to pay a much higher interest rate (probably around 24 percent) to hold commodities in storage.

It is highly desirable to replace threshing machines as they wear out and it may be desirable to consider upgrading of hundreds of milling machines to get a better yield of white rice and to get better quality (fewer broken). Following is some data on the existing stock of farm machinery in two key rice-growing areas:

Table 12: Data on equipment in the Office du Niger rice-growing region:

Item	Number
Villages	249
Families	26,435
Population	350 075
Average farm	3 hectares
Tractors	104
Motor tillers	307 (hand manipulated)
Decorticators	758
Threshers	624

The Mopti Office du Riz area has 131 villages and 154 threshers. Data on equipment prices are shown below.

Table 13: Equipment Prices

Item	Price
Good quality small rice mill	4.9 million CFA
Rice mill with polisher, sorter, and related equipment	8.6 Million CFA
Financing for above rice mill	6 years at 15 percent interest (by Ecobank – from African Development Foundation)
Rice sorting machine	1 million CFA
Small decorticating machine	3 million CFA (circulating to villages – high breakage)
Sacks	225 – 250 CFA
Batteuse (thresher)	3 million CFA
Local storage shed 20 ton	10 million CFA
Large storage shed 100 ton	50 Million CFA (these are storage sheds for shallots. Rice warehouses may be slightly cheaper but should be similar in price.)

It is likely that more of the hand cultivators will be purchased and particularly that the cheap milling machines will be upgraded. As producer associations take an increasingly stronger role in financing village warehouses, larger warehouses will become important. Commercial warehouses with independent control could be used for warehouse receipt financing – permitting a delay in selling rice and/or generating financing for other needs.

While exact data are not available, some reports say that less than half of the farmers in any of the systems use the recommended seeds, herbicides, fertilizers, planting methods, and timing. With good advice and with credit, yields and farm incomes could go up substantially.

Private purchasers from farmers generally pay cash. Reportedly, rice wholesalers commonly give supplier credit to retailers. Businesses with many fixed assets can get bank financing for investments or working capital. International purchases (rice, chemicals) are generally handled by letter of credit.

The team was not able to make a full survey of all interest rates paid. Many rates quoted by contacts did not account for low-interest or non-interest bearing mandatory deposits that increase the effective annual interest rate equivalent. But the following seemed to be representative of the common effective interest rates depending on the value chain level.

Table 14:

Representative effective annual interest rates in Mali	
Farm input loan 2%/month for 7 months	24 percent per annum
Wholesaler level interest rate	15 %
Large industrialist	10 %
Micro credit 5 year loan effective rate from banks	10 %
Micro credit cost of funds from deposits	3 to 6 %
Bank investment in government paper (considered a riskless return)	4%
Bank to Bank Euro lending rate in London	4.13%
Importer credit from European supplier	6 %? (guesstimate)

STORAGE

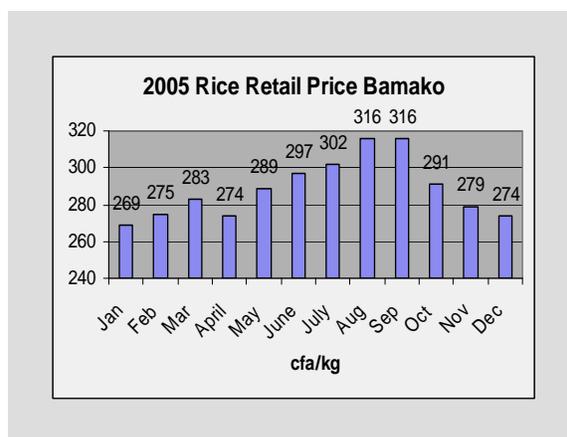
During the investigation, a group of farmers in Niono indicated that their group would like to get credit for their rice in order to delay marketing and obtain a higher price. Given very high interest rates (over 20 percent effective rate after considering deposit and fee requirements), storing for later sale may be questionable for rice producers, although a month or two delay after the largest sales could be desirable. Imported rice apparently helps to level out prices over the year, based on 2005 retail price data. Also the government keeps a security stock of grain that can be released if prices spike.

Presumably there is a close relationship between the retail price of rice and the price to farmers for paddy rice. Average CFA Franc retail prices per month in 2005 in Bamako for rice (average of four weekly price checks) are contained in figure 6 to the right.

So if a farmer had milled rice in January and could hold it until August they might get a higher price. The 1985 Bamako retail data do not support the information from a contact that prices may decline to 180 FCFA/kg in October – December.

Looking at 2005 retail prices the

Figure 6



January/August difference in lowest to highest monthly prices is: 316/269, a 17 percent increase of highest price over lowest price.

Table 15: Holding rice January – August 2005 – costs/benefit:

Should farmers hold rice for market price increase?	
Farmer cost of funds	2% per month
Interest paid 7 x 2% =	14%
Increase in price	17%
Net gain before cost of storage & deterioration	3%
Conclusion: Not worth the risk at the current interest rate. Perhaps store at a level of the value chain where the interest rate is lower.	

If the farmers' group had to pay 2 percent per month interest for 7 months the total interest cost would be 14 percent of the value in interest – leaving 3 percent profit if they time it just right and prices change as expected. That profit would be reduced by storage costs and any storage losses. Given the risk of exchange rate changes in rice import prices (the Euro and CFA have been appreciating recently), the farmer would be taking a big risk for a very small profit potential.

In sum, if the 2005 retail price data are reflective of market fluctuations, it isn't worth it for a farmer or farm organization to store rice for that period of time. Now if the default risk and transaction cost were reduced and the farmer could get credit at half the current rate, it could be profitable to store. A big wholesaler or industrialist might be able to get credit for 10 to 15 percent instead of the 24 percent available to farmers and this would make the advantage of storing clearer. Perhaps there are other advantages in storing at the farm level, such as less pressure on milling, and no need to transport the bran and husk back to the village for animal feed. But there are other risks such as the paddy becoming too dry and breaking in the milling process. Wherever it is stored, it probably makes more sense to store rice after milling - less weight and volume, more definitive quality.

GENDER ISSUES

Both men and women are active in agriculture but it is rare for them to work directly together. Traditionally in many areas men cultivated rice and women cultivated vegetables. But these roles can change, particularly as men (who often can have the final say in the family) seek to enter areas that generate income. Generally it is expected that men do the heavy work of leveling fields and women do the detailed work of transplanting rice. Marketing tends to be by men in many cases, including in the Bamako market. But in Sikasso, rice is a minor crop (less important than cotton and potatoes) and women typically handle rice production and marketing. One report predicted that as water control is established in Bas Fond areas that men could take the land away from women to plant alternative crops. Elsewhere, mostly men handle rice cultivation. In the Office du Niger area of Segou/Niono, almost all rice farmers begin with seedlings in a nursery (pepiniere) and women are paid by the hectare to plant the seedlings and later transplant them. Men generally sell the rice in Bamako market, but women may market the

rice in some areas such as Sikasso. There are some exceptional cases of women doing the complete farming of rice.

Generally women form separate producer or marketing groups and these groups often have better than average repayment records. In Mopti, there are 131 villages and 473 agricultural groups, including 160 women's groups. Women clearly have opportunities to earn money both in producing and selling agricultural goods. But tradition and family influence may tend to exclude them from certain types of work. Generally men and women do not work together in the same field or sell the same type of product in the same market. But traditional lines of separation (men doing heavy ground preparation and tending to handle cereals, women handling vegetables) have tended to blur to some degree. Men in the Dogon Plateau produce shallots. Women in Sikasso produce and sell rice. There is a tendency for men to try to take over the main cash income earning crops and they seem to have power to enforce such decisions within the family and the clan. But women join in groups to grow, process, and sell many commodities. Their role in transplanting rice is crucial, perhaps because they will accept lower compensation, and certainly because they are trusted to do a more careful job. Financial institutions also may take note of the generally better repayment record of women's organizations. Women, individually and in groups, are not prevented from investing (e.g. in a modern rice mill in Niono), hiring male laborers and running a business. Social customs continue to separate women and men in the workplace and disfavor women in family investments in education, but women are often able through hard work and diligence to find ways to earn money from crop production, processing and marketing.

CONCLUDING OVERVIEW

Farmers need better advice and they need credit to buy fertilizer and improved seed. The best opportunities are to improve cultivation practices on existing land so more farmers can move from the 1 ton/ha yield toward the 6 ton/ha possible with reliable control of water. Much information is also needed to improve confidence in the marketing, logistics and financing systems.

Table 16:

Recommendations:	
Farmers need:	<p>Advice on inputs and cultivation</p> <p>Seeds from IER & seed service</p> <p>Water improvements: pumps, maintenance of pumps and canals</p>

Recommendations:	
Strengthen producer associations:	<p>Group input purchases for farmers</p> <p>Some collect fees & use funds to guarantee loans</p> <p>Some can reduce administrative costs of loans</p> <p>Joint warehouses</p> <p>Threshers for hand harvested rice</p>
Banks and micro credit institutions can:	<p>Cooperate to share info on bad credit risks</p> <p>Consider lower interest to members of groups with good payment history</p> <p>Provide more medium term credit for machines and warehouses</p> <p>Provide working capital for processors & for stored grain</p> <p>Use computers and/or local committees to reduce transaction costs</p>
Product standards would:	<p>Help facilitate warehouse receipt financing and distant contacting</p>
Ways to build trust:	<p>Work through trusted intermediary</p> <p>Better communication on market needs and premiums</p> <p>Better information and cooperation on logistics</p> <p>Advance contracting and truck backhauls (cell phones, computers and possibly GPS can help)</p>
Access regional markets	<p>More information on market needs</p> <p>Promote high quality of Mali rice</p> <p>Test high end markets with high quality products</p> <p>Need better milling, better packaging, branding, and promotion (e.g. in supermarkets).</p>

Table 17: Rice Value Chain Analysis: Review of Participant Dynamics

	Input Supply	Production	Storage	Marketing and Sales	Wholesale	Retail
Integration	Not integrated. Fertilizer is imported from Europe. There are about 15 suppliers in Mali. Farmers often unite through their organizations to tender for large offers and to seek credit. They can buy individually for cash at higher prices. Improved seeds come from the Malian government – IER via the seed service.	Large number of growers with a large potential for horizontal integration, most effective for input supply and production credit. Hand harvested rice is threshed in village threshers and milled in small private mills at the town or village level.	Many villages have warehouses to store sacks of rice before or after milling. There is little integration up the value chain for locally produced rice.	Buyers come on scooters to seek out sellers on the farm and later send a truck. In some cases, village organizations may buy rice from farmers or accept it on consignment, paying part to the farmer in advance and the rest after sale. Wholesalers take the rice to Bamako and elsewhere for resale to retailers. Development of trust could increase efficiency of logistics.	There are many traders who purchase local rice. There are only a few traders with the ability to arrange imports directly from Asia (via Abidjan), though many traders could purchase individual truckloads from neighboring countries. One big rice importer also owns a large rice mill for local rice and depots around the country for rice storage and sale. There are also many small wholesalers of local rice. The team met a wholesaler in Bamako who buys local rice from other wholesalers who transport rice from Niono to Bamako twice a week. Generally, aside from the big rice importer/miller, there seems to be little vertical integration. Farmers, small private mill owners, wholesalers, and retailers are separate and tend to deal with each other on a transaction-by-transaction basis. There is some cooperation – e.g. establishment of standard wholesale market days for rice in Bamako.	Little integration for a large number of small retailers. There is no horizontal integration of storage facilities to facilitate bulk purchasing

	Input Supply	Production	Storage	Marketing and Sales	Wholesale	Retail
Governance	Fertilizer is imported. Farmers are told what they should use and apply for the quantities needed and credit. The power is with others – the financial institutions and the government experts. Organization gives farmers a bit more power with competing input sellers.	Farmers are price takers when they sell rice. For inputs and cultivation they rely on government advice. They have little bargaining power but are aware of market prices and have numerous buyers.	Storage is possible on farm, by village warehouses, multi village warehouses or by traders. Farmers need cash so cannot store for long. Producer associations give them a little more power.	Buyer holds most of the power because sellers are eager to sell quickly. Producer associations are beginning to provide more flexibility on sales. If city buyers and village organizations could trust each other (possibly via a trusted intermediary) contracts could be established in advance and both would benefit.	Wholesalers bring trucks to Bamako for sale to retailers.	Free market transactions across the chain with many buyers and sellers little market power by individual players.
Market Information and Linkages	Telephone & internet access to international market information. There are 15-20 input suppliers some with formal linkages to European export houses. Information on prices is available on the web though updated infrequently.	Lack of information on global and regional prices, poor circulation of domestic price information although it is available on the radio. Mistowa collects and distributes retail prices in the region – unsure whether they are accurate.	Farmer associations as intermediaries are beginning to link up for centralized storage. Farmer may own commodity in storage or wait for a residual payment until the product is sold.	Weekly price information available via radio for major Malian market towns and some neighboring countries but little or no communication with bulk purchasers. Trucks come to the weekly markets to purchase or in some case intermediaries are employed to bring together enough product to full a truck	Weak informational linkages between the producer organizations and the wholesalers. Farmers and traders generally know approximate price range in major markets.	Retail prices are published weekly basis by the government (OMA). Prices are negotiated and vary according to supply and demand in the market.

	Input Supply	Production	Storage	Marketing and Sales	Wholesale	Retail
Gender	All input suppliers met were men.	Producers mostly male, except in Sikasso. Women transplant rice in Segou/Niono	Most storage and marketing seems to be by men.	Generally male dominated at the producer and wholesaler level, women dominate in Sikasso.	Male dominated	Mostly male retailers for rice.
Financing	Bank credit is available to the input suppliers, some of whom are formally linked to European exporters.	Individual credit through BNDA, and MFIs, sometimes with a group guarantee, rarely credit directly to a group.	Warehouse receipts financing is a good opportunity to expand – product standards would help.	Full cash payment expected at time of sale in rural areas. Some wholesalers with many physical assets may have bank sources of working capital. Interest rate 10 – 16%	Wholesalers pay cash to farmers. Those with many physical assets may have bank financing of some sort.	Retailers sometimes receive a few days of supplier credit. One wholesaler pays informal 5% fee to authorities to recover defaulted credits.

SHALLOT VALUE CHAIN

ONIONS

The term “onions” frequently includes white onions, red onions, and shallots. Mali production levels have reached 115,000 MT of onions per year of which 22% are the white/red variety, the balance are shallots. This value chain review treats shallots separately from onions, making shallots the subject of value chain analysis, while treating onions as a related product, but with clearly distinct market appeal and consumption characteristics.

During the peak rice production months of June-December, the fresh onion supply, including shallots, rapidly diminishes, allowing for imports from Europe of onions, targeted for urban consumers. Malians prefer eating dried shallots at this time, although red onions (violet galmi), preferred for the stronger taste, do find a year round market. Onions are selected to garnish dishes of meat or salads, as opposed to blending into other ingredients in the preparation of soups, stews, and sauces. Compared to shallots, red onions in Mali hold limited appeal and are not grown, conditioned nor sold in comparable quantities. Red or white onions cost throughout the year 100-200 CFAF more per kilo than shallots.

Onions and shallots are not considered interchangeable in Mali, although some studies suggest that neighboring countries are less discriminating and prepared to substitute. But this may also reflect limited availability of shallots in neighboring countries.

A small portion of red onions consumed in Mali comes from Bamako region gardens, which harvest onions throughout most of the year. Seasonal imports also enter from Niger, mainly to serve the Mopti and Timbuktu regions. These amounts are not significant. Imports from Holland via Dakar (previously Abidjan) are considerably greater, satisfying demand in the Bamako, Segou, and Sikasso centers during the months of scarcity (July into October)). Onion imports into Mali total 415 MT/year according to Eurostat. Mali produces an estimated 26,000 MT of onions requiring therefore little additional input to satisfy all Malian consumption.

Mali’s neighbors are nowhere near as self-sufficient. The West Africa region imports annually 212,000 MT of onions (exclusive of shallots which total only 5,100 MT into the region), with 77% of onion imports going to Senegal, Guinea and the RCI (Eurostat), suggesting an enormous potential for Mali to supply immediate neighboring markets. If the price of onions imported from Europe into Mali is any indicator, however, Mali, to prove competitive to European suppliers currently serving the West African market, would have to produce in the volume required and successfully orchestrate distribution to neighboring country markets, all without incurring excessive cost and waste, in order to maintain sustainable operating margins.

This is not beyond the realm of possibility in Mali. The feasibility of gearing up to tackle this red onion market warrants further investigation, and may open the way to building onion production in Mali into a specialized agribusiness value chain that integrates sound business practices designed to export into neighboring markets.

SHALLOTS

Unlike red onions, shallots in Mali maintain exceptionally wide appeal, with consumption in both fresh and dried (processed) form rapidly accelerating throughout Mali as in neighboring countries of West Africa. While estimates of fresh shallot national output vary considerably, the team has selected the Ministry of Agriculture figure of 150,000 MT for 2005 (The GEOMAR/World Bank estimate is 86,000 MT in 2005). The doubling of Mali’s shallot output

since 2001 has made it the major cash crop not only in the “onion” family, but also when compared to any other vegetable crop variety in production in Mali.

As such, the shallot value chain in Mali holds significant potential to build value through chain enhancements internally, and in the process, shore up an export platform from which to service neighboring regional markets.

Mali produces enough shallots to satisfy national demand and has been doing so while local demand has doubled since 2001. Despite the substantial increase of shallot availability over the past five years in Mali, prices have remained remarkably stable, reflecting increasing demand in tandem with growing rice consumption (shallots are the preferred seasoning in sauces for rice) and also reflecting a transformation option commercially more exploitable than is the case for tomatoes, allowing off take of fresh shallots for conversion to a more durable, dried shallot product.

Shallot consumption and rice consumption are both increasing and the volume of transformed, or dried and packaged produce is rising rapidly as well. (Comparative millet or sorghum consumption, the traditional national meal and not seasoned with shallots, continues to trend slowly downward).

Climate advantages and ready access to Niger River water help make Mali the major shallot producer in West Africa. As such, Mali conceivably can become the premier supplier of this product to its neighbors. Currently, however, the West Africa region imports only 5,115 MT of shallots annually (as opposed to 212,000 MT of larger round onions), but the rate of growth in regional West African demand for shallots seems to be very high.

Consumers prefer fresh shallots, but proper stocking and drying techniques can make shallots available in fresh form for 4-6 months longer, and in dried form, for over a year. Consumers have long demonstrated a willingness to pay a premium when necessary, whether for fresh or dried, since it has become an indispensable condiment for household dishes. Proper storage and drying assures not only availability, but also an eager consumer base willing to provide margins that attract suppliers. This underscores a potentially large export market where fresh or dried shallots could well attract a greater premium price.

Shallots constitute 80% of the national, collectively labeled “onion” crop, produced primarily in the Segou-Niono and Bandiagara regions. The former is within the Office du Niger zone, while the latter is relatively isolated, located approximately 60 kilometers east of Mopti in the “Pays Dogon” region. Intensive gardening around the Bamako region, once the rice harvest is complete is a third, much less significant shallot producing area.

Some private operators conduct intense year round gardening in the Bamako center to service the local market. They build their distribution outlets informally on the site and make this a cash crop business, meeting little competition for fresh shallots during the June-December months, but otherwise less competitive when the main national harvest floods the markets during the January-May period.

Such exports, although small (estimated by the team at 10-15% of national production) have attracted wider interest from the RCI and Guinea, whose traders now enter Mali and purchase eagerly at harvest time the largest tonnage, and continue to purchase the dried, packaged shallots when the fresh product becomes scarce and several more times as costly. This bulk purchase at harvest time reflects the relatively cheap price which shallot grower groups accept, 75 -125 CFAF/kg depending how early the ripening product is harvested, in grower eagerness raise cash and/or to dispose of product before it deteriorates.

KEY CHARACTERISTICS

What was once a relatively exotic garden crop in the 1950's-1960 has evolved into a major cash crop. Among vegetable crop products produced in Mali, the shallot now ranks first in revenue generation. Production has doubled nationally since 2000, with the most rapid growth in the Niono region easily surpassing the Dogon Plateau growing area, which held the lead into the late 1990's.

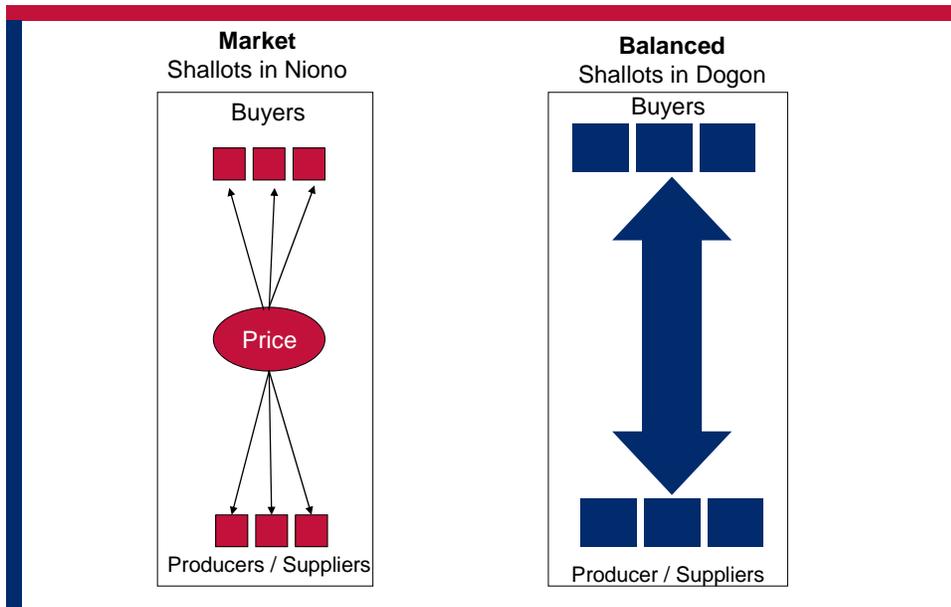
But this surge in Niono-Segou has led to a bifurcated value chain: veteran producers of the Dogon plateau not only organize production more efficiently, but collude to maximize sales price and even station their "agents" as Bamako –based wholesalers. What's more, by rapidly expanding their processing (stocking for storage; drying/packaging for sale or storage) they can successfully limit fresh offerings if price is not attractive while exercising value-enhancing options. This delaying tactic is made possible by a third feature that distinguishes the plateau growers from the Office du Niger (Niono-Segou) namely, bank financing: In the 1999-2000 growing season BNDA committed 90 million CFAF, of which 80 million was utilized, to the plateau growers. The successful operation there suggests strongly that utilization has increased since that time.

Niono-Segou on the other hand, operates more at the new entrant level, showing little coordination among producer associations, untutored production (i.e., follow my neighbor) techniques, defenseless commercialization against savvy wholesalers, no formal or directed distribution network, and up until 2006, no financing. BNDA in the Niono region has initiated inventory financing of well –stored shallots organized by ten producer associations, run by women (Faobougou, 10 km outside Niono) This was also facilitated, however, through the support of Faso Jigi, a 4,500-member union of growers (mainly rice), which has established a credible record of screening member borrowers and even reimbursing lenders for any problem loans. Shallot processing capacity compared to production levels in the Niono region remains miniscule, but is rapidly increasing. This should improve financing opportunities in the future.

The following diagram shows the difference in governance of the value chains between the Dogon Plateau and the larger and newer and larger-producing region – Segou/Niono. Shallot producers in the Dogon Plateau have gained some market power by drying a large part of their crop (giving the flexibility on selling or not), occasional short term horizontal producer agreements on minimum selling prices, and strong two-way information linkages to the wholesale market in Bamako. This is in contrast to Segou/Niono where most of the product is sold fresh, there are large numbers of buyers and sellers, but sellers need to sell right away and have little market power. So the Segou-Niono is the free market situation of governance with no producer power on selling conditions, whereas the Dogon Plateau situation is a more balanced situation, with producers having some influence on marketing conditions for their products. Over time, Segou-Niono producers are likely to move in the direction of the Niono producers, with a larger percentage of product sold dried rather than fresh and more market power for producers and small scale processors.

Figure 7

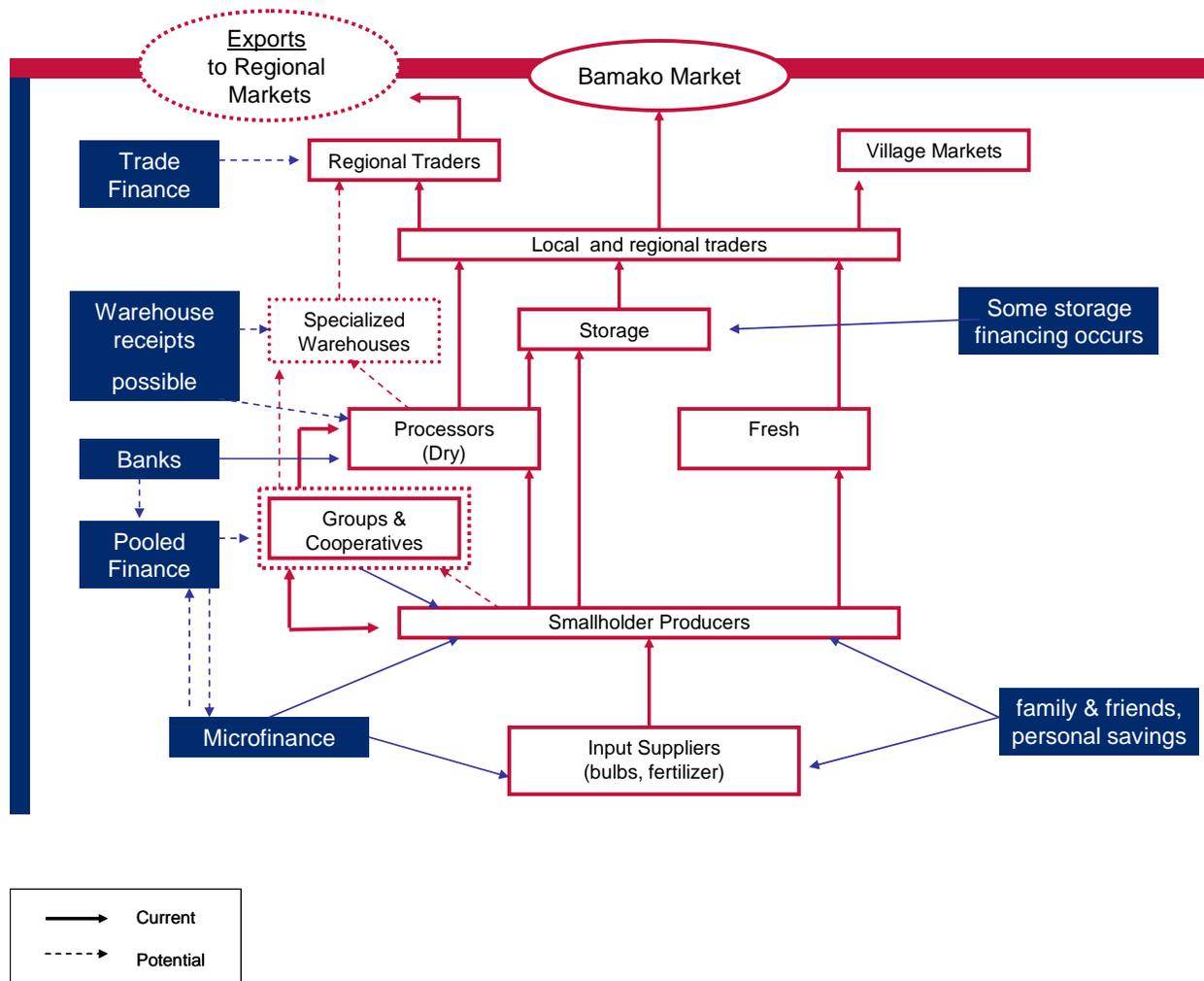
GOVERNANCE : Niono versus Dogon Plateau



Following is a graphic representation of the value chain for shallots – shown as a single value chain, even though the fresh and dried products could be considered as separate value chains.

Figure 8

SHALLOT VALUE CHAIN



INPUT SUPPLY

Original seed variety, known as “tata” seed, is now replicated in finished shallot bulbs which growers simply replant. Some are able to split mature bulbs into easily transplantable seed stock. Left over fertilizer, intended for rice or in some cases cotton, is applied. This is purchased with cash or indirectly in cases through credit intended to acquire fertilizer for the rice season. Most fertilizer used is organic, acquired through barter or cash by grower associations within village surroundings.

Unlike tomatoes, shallots can be cultivated with relatively little pesticide. When applied, it is purchased for cash (the volume used would not attract wholesaler suppliers), or again, indirectly via credit purchase originally intended for rice, but left over and to be used during the *contre-saison*. Ample quantities of organic fertilizer facilitate soil. Soil management is by hand, obviating much use of herbicides.

The input supply chain is essentially local in character in both the Plateau and Office of Niger (ON) regions, with no use of formal credit from lenders, although informal side arrangements allowing for delayed payment or discount for bulk purchase, are likely.

PRODUCTION

Shallot production has risen fivefold since the early 1960's, with half of this volume increase alone occurring since 2000. The national appetite for this vegetable, appreciated for flavor-enhancing soups and stews, suggests continuing strong demand within Mali. Moreover, a small but growing segment is now exported, going to Guinea and the Ivory Coast, primarily in the peak harvest months of January – May.

National production is estimated at 150,000 MT during 2005, with approximately 30% originating out of the Plateau region, twice that from the ON region, and another ten percent in various smaller plots located in the Bamako area. Production units are with few exceptions producer associations consisting of individual growers operating on plots of land measuring from 20m x 20m (equal to 4,225 sq. ft. or a tenth of an acre), or larger, with an average yield of 21MT/ha (equal to 21 MT over a space 25 times the 20m x 20 meter individual plot). This yields to individual growers approximately 55,000 CFAF per harvest on a 20m x 20 m plot of land, given a conservative sales price of 110 CFAF/ kg.

Plateau: Production in the plateau region is managed more carefully, but more successfully, than in the other primary producing region, Segou-Niono in the Office of Niger (O/N) in part because of the scarcity of suitable land, availability of water, but also due to the support initially from GTZ and later from SLAECER (Malian extension cadre) trained by GTZ. In the mid 1980's after the second round of severe drought, GTZ began a shallot production program to improve food production and create a year round cash crop for the Plateau region.

Production plots are essentially built by hand. These consist of stone-encircled zones filled with suitable earth and enriched with substantial organic fertilizer (the region depends on fish, animals, as the other main sources of cash). Factory fertilizer is not used. Yield is higher than the national average, ranging between 23-28 MT/ha equivalent, while the cost of production is 10% cheaper per kg., attributable to a lower cost of fertilizer input. Water is corralled and stored in man-made dams and reservoirs. Most arable land is for growing millet, the primary regional dish. Shallot production is a serious year round undertaking.

The Plateau grows three harvests. The first primary harvest, yielding in volume terms 50% of annual output, occurs in January-February, of which at least one half is sold as fresh shallots; the second harvest in sequence is smaller and mainly conserved; the third is grown primarily to reach full maturity (120 days) and be used as seed stock for the next big harvest.

Office du Niger: Niono – Segou production is less orchestrated, highly entrepreneurial and pursued during the *contre-saison* only. It is appreciated as a seasonal cash crop to supplement household budgets once the principal rice harvest is over. Land and water therefore is readily available. In the late 1990's the Plateau led in shallot production. Niono-Segou now produce twice as much, but this surge in productivity has not been matched with the required technical support both for growing and processing, association integration, management training, and development of commercialization skills that will be essential to control waste, add value, and time product presentation to optimize revenues.

STORED AND DRIED SHALLOTS

A clear case in point, among many, is the processing. Niono-Segou literally floods the market with fresh product, not having the facilities and training to conserve. An estimated 5%-7% of harvest is set aside for drying and/or storage in contrast to the Plateau producers who process an estimated 60% of their annual production either transformed into various forms of dried shallot, or stocked and conserved to be sold after May, or set aside and treated to serve as premium seed to be used in the next main planting. The significance of adding storage capacity is underscored by the fact that fresh shallots sell for as much four times their February-March price in September-November in the principal urban markets. Dried Shallots condense 80%-90% of fresh shallots down to a finished dried product. Figures range from 8 to 10 kgs of fresh to equal one kg of dried shallots, sliced and packed tightly in plastic bags. They vary little in price over the course of a year, much unlike fresh shallots, but in avoiding the cost of conservation facilities, and in making them immediately sellable, although transformed, revenue return can be achieved sooner than simply storing.

One factor that influences harvest timing of shallots is eagerness to secure revenue; shallots yanked prematurely (under 10 weeks) can still sell, although for only 85 cfa/kilo. The value of the bulb rises as it is allowed to mature (fully mature at 120 days). In this sense, the uncollected crop is a sort of fund of last resort in a way that most other garden crops cannot be.

SALE AND DOWNSTREAM COMMERCIALIZATION

The Plateau producers arrange through producer association intermediaries to move product to collection points and from there to the main staging area in Bandiagara. Traders come to purchase, but do not always find the price they want. That the plateau selling arm can refuse to sell and not suffer the consequences indicates the relative commercial strength. What needs clarification is how much of this leverage benefits the grower directly and how much is pocketed by association intermediaries (privileged information is highly localized and there was not enough time to actually visit Bandiagara or the grower associations). The Plateau producer associations also maintain a wholesale outlet in Bamako and hire transporters through intermediaries to ship their product to the Medina market in Bamako.

The ON producers in the Niono –Segou area exercise little leverage. Trucks from as far away as Abidjan line up during the peak harvest period (February-April) to pick up fresh shallots at an average price of 115-150/kg (although less mature bulbs fetch only 75-90 cfa/kg). The regional staging areas are Niono and Segou, although some wholesalers go to collection points closer to villages and accessible by truck.

Wholesalers from Bamako send 40-60 MT trucks that bring produce down daily to the main vegetables markets Medina and Dibida.

Table 18: Prices of Fresh Shallots

Fresh Shallots			
CFA/kg	Feb-March	May-June	Sept-Nov
Ave Price to Producer	115-125	225-275	400-600
Intermediaries	100-150	100-150	100-150
Consumer	225-275	325-425	500-750

PROCESSING AND STORAGE

Relative to the national output of shallots, overall storage and transformation capacity is totally inadequate. Higher returns are lowered due to inability to satisfy market demand in quantities

desired of processed shallots. Clearly the prices indicated above would not ratchet up so distinctly were, say 50% of the national crop conserved under correct storage conditions (as opposed to only 10%-15%, despite the significant storage—estimated at 50%-60% of production -undertaken in the Plateau region).

Restricted supply of fresh shallots, when larger portions are set aside for processing, would immediately put more revenue/kg. into the hands of the growers, as intermediary margins are comparatively stable compared to the escalating price of fresh shallots. Moreover, higher prices, say double to that of Feb-Mar as opposed to four times greater could still enable better margins again, net of conservation costs (depending on volume handled per conservation unit), over the course of the remaining 4-6 months.

Processed shallots that are dried enter different markets. At the low end are the more unsightly shallots, which are pulverized in their entirety into a mash, rolled into balls, dried and sold unpackaged. This is produced in both Plateau and O/N regions for shipment to northern (Malian) markets primarily, but also to the larger urban markets in the south. More costly to prepare are the sliced and dried shallots. Slicing is increasingly done by machine. More hand slicing is done in the O/N region and different interpretations of the benefit this brings prevail. Shipments of dried sliced shallots serve mainly the major urban markets and are exported to neighboring countries.

Appearance of dried packaged (transparent plastic), shallots influences price: the lighter the color the better. Bottom price runs from 1,500 –1800 cfa/kg, while the lighter colors range from 2,200 to 3,000 kg. During the leanest shallot months of September-December, when no fresh substitutes are to be had, the prices of all varieties notch up another 10%-20%.

GENDER

Women are the most active participants in the shallot value chain, although at critical junctures, their representation is weak; they participate less in soil preparation, in price negotiation, in transport activities, and in wholesaling. Women associations specialize primarily in production and processing. This picture is especially true in the O/N producing area, mainly because shallots are a *contre-saison* crop and as some local producers express it, a chance for women to earn some spending money on land otherwise dedicated for rice production.

Women groups who produce need direction on how to organize in sufficient numbers to influence the price at point of sale. This could be realized in a second initiative to expand processing capacity, also controlled by women, as additional leverage to get better prices for the harvested crop.

In contrast, the Plateau value chain has much greater male participation, not only at the critical junctures cited above, but in every other phase as well. There is no *contre-saison* here as the product is grown virtually throughout the entire year. Shallots are very serious business, a primary cash crop for the region, and men insert themselves in this activity in a way similar to how men in other regions dominate the rice value chain. If pursuing the path of least resistance can be a guide, the region for intervention to strengthen women's role in the shallot value chain is clearly at the O/N.

MARKET INFORMATION OPPORTUNITIES

Market information is less useful during the input and production phase compared to the processing, sale, and distribution phases. Inputs are readily available through small-scale purchases and barter exchange. Large-scale input merchants to date have not found shallots a

particularly attractive line to service. Were market information better organized, transparent, and linked to prices in target export markets in addition to Malian markets, production decisions could appear more rational, and input supply intermediaries would be better motivated to time their offerings accordingly.

Not all shallots can be harvested with the optimum price of sale in mind. A portion of the harvest, for example, is yanked prematurely to pay the *redevance*, or water usage fee for the upcoming rice-growing season. Many other immediate household expenditures must be financed in this way.

Nonetheless, as harvest approaches there is urgent need to diffuse among all growing associations daily price movement for delivery to urban markets, if only to arbitrage a higher fresh shallot sales price once delivery costs incurred by transporters are factored in. Here again, knowing competitive transport costs would be an asset to the growers, seeking to squeeze the best margins.

Plateau growers have been producing and selling shallots on a commercial scale for over 20 years and have learned the advantages of linking to their own wholesale agents in Bamako to give an accurate picture of market prices. The O/N growers, however, have not yet evolved to that point, but should be able to with training and guidance. We learned from grower representatives while in Niono that attempts to eliminate commercialization intermediaries by taking product directly to Bamako markets like Medina or Dibida have failed to get the desired result mainly because shallot wholesalers in Bamako will buy only from their circuit, and this circuit obtains shallots at the lowest prices. The Plateau growers have created wholesale linkages within Bamako markets and move their product more quickly.

Women's' associations active in shallot production and processing (this number totals 170 according to the World Bank) need daily market information on fresh shallot prices as they trend upward. Stored shallots appreciate in cfa value at a much faster rate than they lose kilogram weight. Trading off weight loss against upward trending prices could guide product release decisions to better effect for the processing association. The premise here is that transport intermediaries, knowing the processors have reliable market data will also know that shallot processors have a tool to incite competition among transporters.

Market information is less time sensitive in the case of dried shallots. Their price movement is not seasonally triggered. But as a desired and presumably scarce commodity, knowing how different markets value dried shallots at any point in time would be highly beneficial to the transforming segment of the value chain. What's more, this commodity niche in the export market has the highest potential for immediate expansion (gearing up for agro industrial scale and export of all categories of shallots is a long term possibility at best). Developing a sophisticated and voluminous export capability, just starting in dried shallots, matched in turn with timely market information, would significantly boost value in the shallot sector.

FINANCE

Lenders have historically shown little interest in financing garden, *contre-saison* type crops. In the last decade, however, shallots have caught the attention of BNDA, starting with the Plateau growers (cfa 90 million committed in 1999-2000 and presumably more each year since, although Plateau production has been expanding at a much slower rate than in the O/N).

Close integration among producers and processors, plus demonstrated market sophistication in negotiating sale and placing product on to the retail network, have collectively introduced an element of predictability of cash flow. This likelihood of cash flow is enhanced through product

storing and transformation as both options guarantee future revenues – storage offers higher margins, drying enables a full cost recovery (although relatively smaller margin) for excess or odd-shaped fresh shallot production that might otherwise go to waste. The Plateau region now stores or transforms over 60% of its annual three-harvest shallot-growing year.

Only in the past year (2006) has some bank financing filtered into the O/N shallot value chain. BNDA has lent up to cfa 20 million to women associations storing fresh shallot for sale within the following 4-6 months. This would not have been possible if the storage facility was faulty and if the association management had not already established profitable outlets/network for sale of the stored shallots. Based on BNDA's successful experience with the Plateau producers of stored and dried shallots, additional working capital financing for an appreciating inventory of shallots may follow as well in the O/N value chain.

Dried shallot demand is steadier and also growing, although the commercialization network is less formal throughout Mali, reflecting its relatively smaller size (estimated at around 15% of the current total crop). Dried shallots are used in all parts of Mali, but relative to population, even more so in the South. In recent years, traders from neighboring Guinea and Cote d'Ivoire have added packaged dried shallots to their fresh shallot purchases with a view to selling dried shallots, which store well, once the fresh crop is depleted in the market place. Developing this outlet further in Mali offers the possibility for additional short term financing to the processor who can fully recover cost plus margins at time of sale into the wholesale/retail network.

Financing is desperately needed throughout this sector to build storage and transformation infrastructure. An enormous gap exists between the need and what is currently available. Lost margins to growers and processors for lack of storage and drying infrastructure beckons financing instruments that introduce a permanent and systemic boost to the entire value chain. A basic storage hut, built with traditional, local materials, costs around cfa 5 million for 15-20 ton capacity. This facility must be rebuilt every five years. The NGO Alfalog has introduced another model, which stores twice as much and lasts 10 years, costing 10-12 million cfa. The most sophisticated, holding 100 tons, cost some 60 million cfa. This was financed through a donor project (USAID/ Mali SEG-CAE, located in Fouabogou). There is only one like this in Mali.

Better organization of women associations is a necessary first step. But they generally lack sufficient investment capital or equity to fortify the balance sheet or to persuade potential creditors that operators have put their own funds at risk first. In addition, the association must establish a successful operating history to reinforce the likelihood of medium term loan recovery. The interest rate is high compared to commercial loans, but this need not be an obstacle where volume (sales) is sufficient to overcome bank credit costs. Operators will sooner complain that interest rates are too high than that their scale of operation too small, or cost controls inadequate. Equipment leasing may prove a best compromise, where transformation assets remain the property of the lender, who is paid in installments, but who induces the lessee to purchase equipment at an agreed residual at some point in the repayment cycle.

CONCLUDING OVERVIEW

The opportunity for significant shallot value chain enhancement exist in Mali, offering both broad impact as shallot production continues to rise, significant opportunities for improved margins for rural operators seeking to supplement household income, and for regional exports by entrepreneurs and traders of dried shallots in the short term. The longer term 3+ year outlook may warrant agribusiness scale production if it becomes clear that there is as well a meaningful export potential of fresh shallots to the West African regional markets.

The first measures must focus on organizing producers, improving their soil management, seeding, sorting and delivery practices; training of producer association leaders in basic finance, marketing and networking into broader alliances of operators with similar objectives—the Plateau growers offer a one example, perhaps a living model, of the direction that O/N producers must go, although on a different scale given the natural and logistical advantages that exist there. Raising productivity and concurrently raising return on investment (inputs, but labor as well) while conditioning leadership to capitalize on this through stronger negotiation and commercialization tactics will significantly improve margins for most operators active in the shallot value chain.

Imports of shallots to the West Africa region are relatively small currently (5,100 MT) and it is wide open to speculation as to how much this region would prefer shallots compared to onions, which are already imported in great quantity (212,000 MT). Making headway in the bigger market for onions would prepare Malian fresh shallot exporters to supplement their offerings through an existing export network.

Therefore, the recommendation would be to work through the diseconomies and inefficiencies that hurt the bottom line for most operators as a first priority. Concurrently, the potential to export shallots must be explored with the reasonable assumption that this business could not realistically sustain itself if not operated on a professional, agribusiness scale. Such evolution is needed to promote employment and enhance rural income, but requires a level of consciousness and commitment within the value chain that presently appears ahead of its time.

Table 19: Shallots Value Chain

Stage of Chain	Achievements	Problem Areas	Proposed Interventions	Anticipated Outcomes
Varieties	Varieties are local – white color is preferred. In 2007, IER finished selection of some good quality bulbs for multiplication by seed service.	Few problems with shallots – relatively few diseases – replanting bulbs works well. Problem is shallots go rotten in storage with excess heat or humidity – affects planting bulbs too.	Publicize new varieties from IER and explore multiplication, credit.	Advice to farmers could help them choose the best varieties.
Input Distribution	In Dogon Plateau, farmers use manure. Farmers replant local bulbs, though some purchase from late production of others.	Niono producers need to buy some imported chemical fertilizer. All producers may need some credit. Dogon Plateau has credit from BNDA for a number of years.	Advise farmers on composting and other techniques – mostly in Niono – newer production area. Dogon producers are well informed on cultivation.	Better planning can lower costs and/or increase yields.
Production Systems	Large fresh production drives down prices, even though demand is strong. Producers increasingly drying with several qualities. Segou/Niono seems to have best dried quality.	Sun drying may be problematical – take more than 24 hrs. Full range of drying options/qualities and financing for those options not known. Strong entrepreneur for industrial processing, packaging and regional marketing would be useful.	Seminar would be useful in Niono to assist in production methods and credit issues and in both Niono and Dogon plateau on issues related to drying. Project might be able to create commercial/financial linkages to permit high quality production/regional distribution of dried product. One option – cooperation with existing successful local spice manufacturer.	Farm income could be raised, if they could be persuaded of the merits of cooperation on production and marketing. If credit and other problems resolved, Mali could increase production by a factor of at least 3.
Post-harvest Handling	Shallots can rot with improper storage conditions or excessive heat or humidity.	Early storage and packaging for shipping could influence durability. Pre-cooling in a ventilated storage shed could be useful.	Seminar with producers could explore best options for packages and shipping.	Farmers and traders could reduce logistics costs and raise quality of product and possibly returns – particularly for an upscale market channels.

Village Level Processing	Shallots can be sliced by machine (very common) or by hand. Drying can be simple wood frame with mosquito nets or more complex with fans.	Slicing machines damage texture of highest quality shallots. Packaging is non-standard.	Niono has more need for expansion of drying. Dogon Plateau could upgrade with better methods and machines.	Higher quality dried shallots could increase market power of producers, give good returns, develop regional market.
Industrial Processing	One Bamako based small scale shallot processor in the April workshop called for industrial drying/packaging.	Products are poorly packaged at present – faced marketing difficulties in Togo as a result of concerns about origins, contents.	Discussion with main actors in shallots may lead to development of an industrial level entrepreneur to develop a good slicing machine (perhaps just adjust cutting blades of existing machines) and establish reliable supplies, high quality, good packaging and labeling, and a marketing campaign with bank credit, and modest donor help on in-store marketing campaigns.	Development of large, regional high quality dried shallots market seems very possible. Would result in better income for producers and forestall risk of national oversupply as Niono-Segou production continues to increase.
Storage	Ventilated storage could extend fresh shallot shelf life 2 months until prices rise. Could be used for other products in other seasons (inputs, harvests)	Could build local ventilated storage shed for about 10 million cfa. Would need credit. Shallots will lose weight in storage and some losses.	Explore options for storage with producers in seminars and follow up. Need to study full costs/benefits on decision of whether to store and where.	Good storage could reduce deterioration/losses even for near term sales. Multi crop use for storage facilities could make them economical
Marketing/distribution	Fresh market and processed markets strong and growing in urban areas and in region.	Farmers need funds quickly, so are eager to sell fresh if possible. Buyers market.	Numerous issues on improving logistics and lowering costs could be explored. Opportunities for storage and drying are part of the mix, not only for individual farmers, but also for entrepreneurial cooperatives (e.g. women's cooperatives in Segou/Niono) seeking to expand.	Major opportunities for improvement/expansion could have significant impact on incomes in all producing regions.

End Uses in Domestic Market	Fresh is most appreciated but all three qualities of dried shallots (grated white, balls of skins etc, ground powder) find a good market in Mali	Need good market contacts. Niono producers were blocked by wholesalers in Bamako when tried direct marketing. Dogon Bamako wholesale linkages could be a model.	Seminar with key actors could increase opportunities for marketing cooperation, better processing, financing. Info flow on end market demand and marketing campaigns to develop further are needed.	Increase in dried quality and better marketing could have major benefits in terms of returns to traders and farmers.
Import Competition	Europe exports only 5,000 tons/year of shallots to West Africa. Little competition when Mali can supply.	Consumer acceptance of high quality dried product needs to be expanded in Mali and the region.	Higher quality, industrial packaging, and marketing campaigns need to be encouraged – all through private entrepreneurs with bank credit.	Imports from Europe don't seem a threat to Mali. Regional production creates demand for shallots but doesn't threaten Mali.
Export Opportunities	Excellent export opportunities to neighboring countries – Guinea, Ghana, Togo, Cote d'Ivoire, possibly others.	Issue of purchases will be key. May be strong buying networks –e.g. buyers for Lebanese stores. Advance contacts highly desirable.	Need to reach out to regional markets and find buyers and improve coordination on purchases and transport logistics. Marketing campaign with taste test for branded product desirable.	Mali seems to have a wonderful comparative advantage that can greatly benefit farmers, processors, and traders.

TOMATO VALUE CHAIN

KEY CHARACTERISTICS

Tomato production is widespread throughout Mali during the *contre-saison* that immediately follows the rice harvest of October-December and extends into April. The national harvest of tomatoes is consumed in Mali as fresh tomato, although there are a few transformation specialists who condition this product for sale in urban areas and for export. This activity is miniscule, although performe highly customer oriented: Malians generally dislike the look and taste of dried tomatoes.

The World Bank estimates that Mali grew 64,000 MT of fresh tomato in 2005 over an area of 3,200 hectares (yield of around 20 MT /ha.) of which one third was consumed at home by growers while the balance, some 40,000 MT, was brought to market for sale.

Fresh tomato growers who commercialize in large quantity operate primarily around Bamako, Niono-Ségou, and Mopti. A small number of operators in the Bamako region complete more than one harvest cycle to sell to urban consumers prepared to pay a higher price during the period April-July and October –December. We estimate this level of fresh tomato production intended for sale during such non-peak production periods at approximately 10-15% of the annual cumulative national harvest. During August and September fresh tomatoes are scarce, being the rainiest, least productive, and most disease-ridden period of the year for this highly perishable crop.

The fact that Mali can produce adequate quantities of tomatoes so readily presents no immediate advantages in developing a competitive "filière" for numerous reasons.

- Seeds are not culled, stored, or planted to target markets.
- Production is inherently speculative, being geared to prices prevailing the previous harvest-sale cycle.
- Production presumes a high level of wastage, both in the field before harvest and afterwards, which defeats efficiency (reducing wastage) while raising speculative risks of return.
- Perishable tomatoes pressure growers to dispose rapidly, i.e. sell within 24 hours of harvest.
- This cycle fosters indifference to production planning, post harvest controls, and formalizing the commercialization cycle.

What's more, as a tomato producer, Mali is relatively insignificant in the sub-region. Its contribution of only 2% annually of the West African regional crop is insignificant when compared with Nigeria, which grows 50% of regional tomato output. Ghana and the Cote d'Ivoire, whose populations more closely match Mali's, grow jointly 25% of West African tomatoes. Senegal's production exceeds Mali's by 50% and also has comparatively significant transformation and strategic export advantages more difficult if not impossible to replicate in Mali.

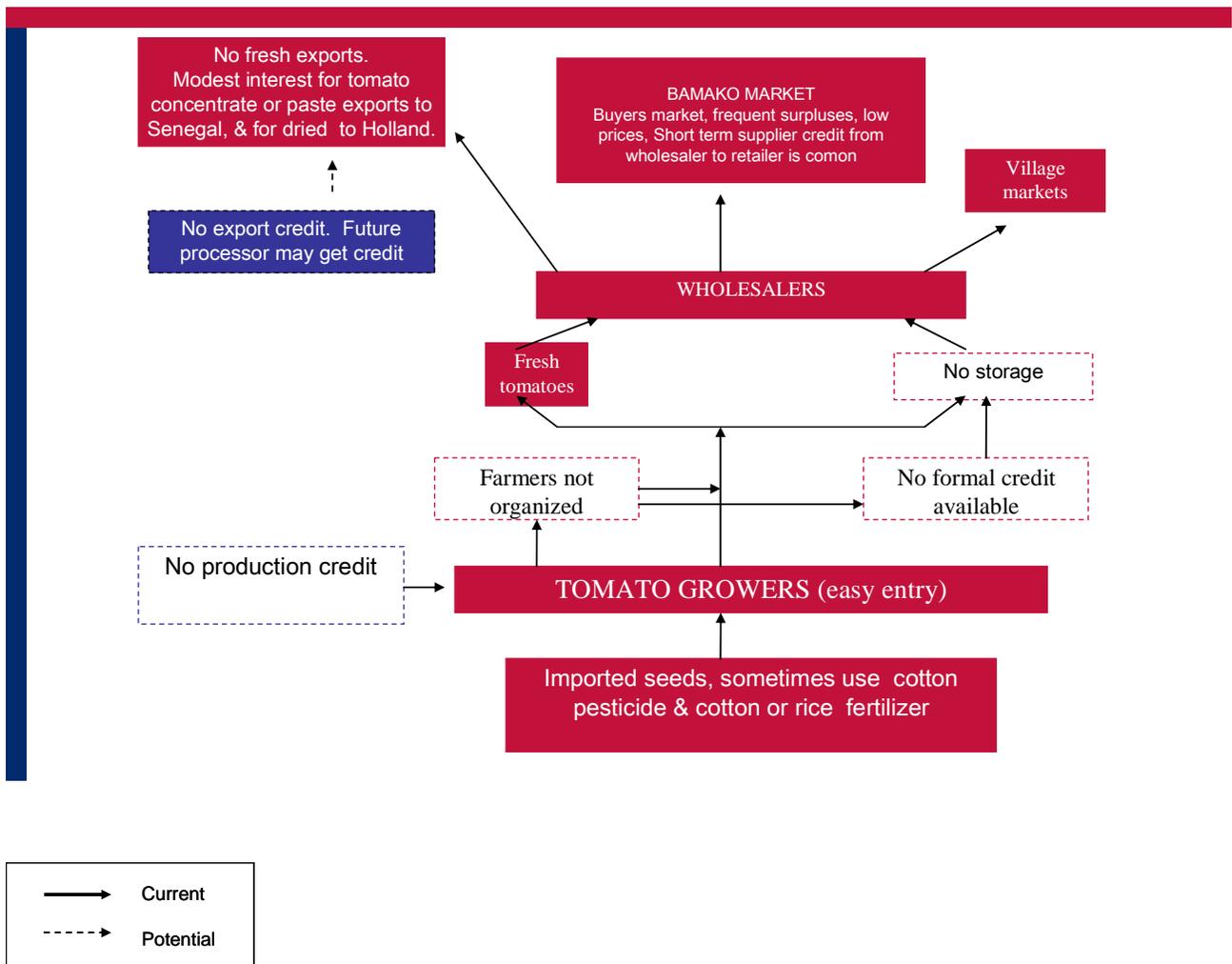
Weak horizontal integration contributes to a free market environment, but as the product is highly perishable, a cycle repeats itself where those who have already invested (grower) are vulnerable to exploitation from buyers who, having invested nothing, are under no pressure to recover costs. Better horizontal integration among growers to scale production to

regional/national demand and set price and quality standards may offer the quickest solution to the perennial excess.

Here is a graphic display of the value chain for tomatoes. We have taken the liberty of using a single value chain, though it could be appropriate to consider dried or cherry tomatoes or the varieties of tomatoes used for industrial tomato paste as separate individual value chains.

Figure 9

TOMATO VALUE CHAIN



INPUT SUPPLY

Seeds are readily available in small packets in local markets, imported through French (Techniseme) and Dutch companies and distributed through an informal network of many merchants who operate in town markets. The distribution chain is highly decentralized. Growers also recycle seed by selecting and drying out seed from previous harvest, this constituting easily one half of tomato seed planted annually.

The seed stock is essentially for fresh tomatoes, having 3% dry matter, and much less so for transformation tomatoes, having 6% dry matter. It is argued by some that increasing the availability of transformation tomatoes would reduce wastage (harder skins) and prolong commercialization.

Chemical and organic fertilizer is applied, usually without regard to composition and application procedures. Herbicide and pesticides are costly and little applied given the low margin and speculative nature of tomato production. Organic fertilizer is preferred and readily available from village sources. No special tools are required other than those traditionally used in connection with the main crop harvest (rice, millet, wheat, sorghum, etc). Purchase of inputs is via cash, although cases of informal credit are likely. Input materials in effect are widely available and sold through numerous operators who actively compete on price.

PRODUCTION

According to the World Bank, the national tomato crop totaled 64,000 MT in 2005, a relatively modest figure compared to other estimates reviewed, but very close to the Ministry of Agriculture estimate of 64,600 MT. Grown and consumed widely in Mali, tomatoes commercialized average around 40,000 MT. Up until the late 1990's Koulikoro near Bamako was the primary producing region with Mopti running a close second, with both combined producing around 80% of the national crop. By 2006, over an estimated 75% of production commercialized came out of the Mopti and the Ségou-Niono regions. The closing of the SOMACO tomato paste facility near Baguineda just outside Bamako, leaf curl virus transmitted by white flies, compounded with Bamako urban expansion collectively reduced production. The increase in the Niono-Ségou area underscores the ease at which new producers may enter this market, perhaps induced by higher prices once production declined in the Bamako basin

While up country producer associations dominate the production and post harvest cycle and produce great quantities only during the December-May period, the Bamako region is increasingly seeing individual private holders making tomato production an almost year round business. If the Senegalese triple concentrate pulp venture takes hold, a likely outcome would be expanded tomato production in Mali around the Bamako basin led by combinations of outlying grower associations, but also independent entrepreneurs eager to fulfill production specifications.

Estimates from several sources indicated fairly consistently that 40% is lost in the field while another 20—25% post harvest does not survive the trip to market or is not sold in time and must be discarded. This would suggest that some 45%-48% of the planted crop is eventually consumed. This tomato abundance occurs primarily during the January-April period.

The vast majority of tomato production is in essence supply driven: Growers with available land during the *contre-saison* decide which crops to grow. Tomatoes are often preferred because a wide variety of seeds that do well in Mali are easily circulated, crops tend to be abundant in appearance and weight, and demand for this product runs continuously throughout the year. Tomatoes are not a business crop so much as a means to earn extra revenue after the main harvest season winds down (November). Growers are willing to incur waste; some revenue earned on what is eventually harvested and sold is better than none. Exceptions to this would include a select number of private growers in the immediate Bamako (Baguineda) area who grow to capitalize on the perennial demand and who have easy access to the consumer market.

Despite production deficiencies related to poor monitoring of seed quality, inappropriate applications of chemical fertilizer, timing of harvest (Maliens don't harvest until the tomato is fully

ripe), complicated further by post harvest handling and transport constraints, oversupply emerges suddenly and perennially for lack of production and sales coordination.

SALES AND COMMERCIAL DISTRIBUTION

As harvest approaches during the *contre-saison*, trucks, unsolicited by producer associations, make their way to staging points—Mopti, Ségou, Niono, and the Koulikoro area North of Bamako. Producer associations grow and sell their product at these collections points to intermediaries who negotiate with buyers, some of whom may own the trucks, but in many cases, do not. Truckers can become wholesalers simply by being present at a tomato staging point and purchasing product to take down. Delivery is to the major markets in Southern Mali, mainly to Bamako, as well as to the nearer town markets. Individual wholesalers typically work informally with a cadre of retailers who purchase and sell the final product, often with assistance of wholesaler credit not exceeding a week.

Table 20:

	Jan-March (CFA/kg)	April-Sept (CFA/kg)	Oct-Jan (CFA/kg)
Revenue to producer	125-250	250-550	400-150
Revenue to intermediaries	125-175	125-175	125-175
Cost to Consumer	250-425	375-675	525-325

Most wastage occurs before wholesalers sell to their retail network. Producer associations organize production and sale into their local town markets, functioning through their network as retailers in the open markets. Here transport from field to market is short and wastage less, but oversupply emerges as well, reducing returns to growers. Competition is intense at every level. Growers have no forward contracts and sell to highest bidder at the time. This pattern is replicated down the line, making every day during harvest a new day to set the price. Buyers neither dominate this market, (although will exploit the fact that growers need to recover their costs while their crop loses value by the day), nor do sellers, whose numbers swell during the peak availability period, show interest in collusion. This daily revised free market frenzy extends to the wholesaler-retailer level.

PROCESSING

A fraction of the national harvest is processed into other marketable forms. Highly perishable goods like tomatoes require an exceptional degree of business investment, infrastructure, and logistical organization to serve significant markets. Mali may evolve first in expanding its dried tomato activity and building new long-term market linkages, as the markets are there and the required technology uncomplicated. The issue of dried tomatoes, cherry tomatoes, and tomato paste is reviewed in greater detail in the closing comments.

Collecting, washing, sorting, and packing (in 30 kilo baskets) are what most processing consists of in the tomato “filière” at the present time.

GENDER ISSUES

A very small number of male entrepreneurs take active part in the production and marketing of their tomato crop. Although several male producers whom we interviewed insisted that they share production and some post harvest responsibilities with women. More clearly, men

generally prepare the land for seed planting, but leave the growing, harvesting, and post harvest chores primarily to women. Men enter again in the commercialization cycle as transporters and wholesalers while women completely dominate the retailer network.

Tedious, repetitive chores are often left to women, but the male perspective sometimes changes when substantial earnings are likely.

Where tomatoes are seen as an important cash crop for the household and where the grower owns or has traditional title to land and is in a position to carry out several harvests over the course of one year, it is often a male who handles all aspects of tomato cultivation and marketing, hiring additional labor (including women) to fit market needs. In rural areas where tomatoes are a seasonal group activity organized at producer association level, women dominate in most segments of the value chain.

MARKET INFORMATION OPPORTUNITIES

There is an abundance of market information available once harvest is ready for sale. What plagues the tomato “filière” is lack of horizontal integration among multiple players who enter the “filière” with great ease at one point or another: Growers individually and in groups within the various village grower associations typically fail to coordinate production amounts and timing, nor do they collaborate pricing to set in negotiations. No market information or forecast mechanism, applying pricing and consumption data is in place that allows growers to determine what portion of their intended production level would be unmarketable and therefore how better to invest one’s resources. Training of grower associations in collaborative measures to leverage themselves for a higher return on investment is needed in addition to external support to put in operation information resources that they would come to rely on.

FINANCE

The highly speculative nature of production outcome has discouraged formal lending institutions from entering this “filière.” The fact that growers don’t work in consort to forge a level of predictability of outcomes suggests to the formal financing sector that risk far exceeds any hope for reward. Introducing guarantees to institutional lenders, whether written or physically secured, would serve no useful purpose since the formal financial sector abhors exercising guarantees or collecting default collateral as a means of conducting routine business.

Supply inputs are secured through direct purchase and through informal lending. Informal credit occurs most frequently at the wholesale-retail level; most production is rural and growers there do not sell on credit. But as the product arrives in large market areas, wholesalers dispense of their supply more quickly by providing credit up to one week to retailers. Still under this scenario, we hear frequently of failure to reimburse. This would be less likely to occur if oversupply was eliminated and the tomato became a managed commodity; credit arrangements would be more respected because it would become more in the interest of the borrower to repay than the wholesaler to lend.

CONCLUDING OVERVIEW

Measuring both its in-country performance and competitive position regionally, Mali stands far behind its immediate neighbors. Much improvement in this “filière” is possible nonetheless if only to reduce wastage through both improved production and commercialization efficiencies

Converting tomato production to an agribusiness would require enormous capital investment, something that is not likely at all in the near term. There are however encouraging signs that potentially may shift a portion of the national crop in this direction.

Dried Tomatoes

Notwithstanding the Malian disinterest in dried tomatoes, this item is more popular in the West African region and increasingly so in Europe, which in 2005 imported 3,790 MT of dried tomatoes (The USA imported 11,100 MT in 2005). One company in Holland has identified a Malian partner to open a tomato drying joint venture (Malisol). The Dutch technical assistance program has agreed to invest 500,000 Euros, while the private Dutch and Malian partners put in 300,000 Euros of their own capital to open such a facility and to commence operations within the next two years. This product sells in Europe at 3 Euros per 100 grams and would be purchased by the Dutch partner/wholesaler who would provide the seeds and technical assistance at 10 Euros per kilo. The Dutch offer will be withdrawn by late 2008 if there is no movement forward on this. West Africa plays a very small role in serving this EU market, although Senegal (110 tons in 2005) is in the lead. Competing successfully against Tunisia, Morocco, and Israel in servicing the EU market would remain a serious challenge should Mali get production started.

Cherry Tomatoes

The EU market imports some 30,000 MT tons of cherry tomatoes annually. Currently these are grown in Mali in very small quantities; not only are they different, highly perishable, and more difficult to safely transport to market, they are generally disliked by the Malians due to their comparatively bitter taste. Approaching a cherry tomato venture with the EU market in mind would require some very careful calculations and risk assessments before proceeding. Senegal is already selling 112 MT of cherry tomatoes annually to this market, which attracts imports from North African countries closer to the EU end market. Demand peaks between December and March, suggesting an agribusiness approach capable of orchestrating tomato-based products synchronized to seasonal demand in the target market. This would require a strong partner with technology, capital, and a market network managing a vertically integrated operation in Mali.

Tomato Paste

There are many explanations as to why the one tomato paste plant in Mali shut down in 1999. In the near term, Mali is not prepared to try again on its own. One Turkish group offered to set up a plant around Ségou in 2004, providing seed, training, and some supplier credit to its growers. This proposal has stalled at the Ministry level. More recently, SOMACOS in Senegal, which has been producing tomato paste for years, has formalized an agreement with Malian grower associations and private operators in the Bamako basin (Baguineda and Kati) to provide triple concentrate pulp to be converted through dilution by SOMACOS into double concentrate paste for canning. Mali's comparative advantage is more water availability enabling higher tomato crop yields and conversion to triple concentrate pulp, which also requires much water to be applied. A first year work plan is the next step in this process. Success here would not spell immediate entry to the West African market, with Mali a supplier to the transformation unit in Senegal: In recent years West Africa has averaged 125,000 MT of tomato paste imports, virtually all from Italy, which operates on an efficient industrial scale.

Table 21: Tomato Value Chain Analysis: Review of Participant Dynamics

	Input	Production	Processing	Assembly and Sale	Wholesale	Retail
Integration	Suppliers compete actively among themselves; Buyers purchase in groups or individually	Horizontal integration among village groups, informal coops. Private operators in Bamako - Koulikoro region. Informal vertical integration (producer-seller among same producer association)	Producer association horizontal integration in collecting, washing, and sorting	Little horizontal integration as growers deliver product and vie with each other for market share. No vertical integration	Perishable nature of fresh crop precludes horizontal integration among wholesalers in effort to get product to retail network in time	Little integration overall. Close horizontal where producer association organizes sale of its own production by fellow members, implying as well vertical integration of function
Governance	Free market: Many buyers and many sellers interact. No buyer or seller can manipulate market	Free-market, but because of perishable product, buyers can easily exploit oversupply situations	Balanced relationship. No dominance of intermediate handling. Much processing done by grower.	Free market. Shared sense of urgency getting product to market. Numerous buyers ensure fair pricing	Buyer directed for those seeking to sell large quantities	Free market due to multitude of retailers and options available to consumers
Market Information and Linkages	Village sourcing from local suppliers; also imports from French, Dutch sources	Price data fluctuates by the day. Direct linkage between producer/producer groups and its wholesale network. Some private operators sell directly into their network.	Processing minimal and done on site. Little formalized linkages between village level associations	No communication with bulk purchasers. Trucks come daily during harvest; purchase opportunistically without prior agreement.	Weak information linkages between grower associations. Villages operate independently; opportunity for group pricing lost	Open and free communication. Access to all conceivable market outlets. Points of sale numerous and pricing openly negotiated

	Input	Production	Processing	Assembly and Sale	Wholesale	Retail
Gender	Shared role in furnishing or buying inputs	Women dominate production activity; although some male private operators supervise production on own fields (minor role)	Women dominate in this role. Tomato post harvest preparation considered tedious and low margin	Shared between genders. Commercialization entry seen as legitimate male pursuit.	Men dominate, sending up trucks to pick up tomatoes and bring them to urban markets daily for resale	Women dominate completely the retailing of tomatoes.
Financing	No formalized credit product; banks not active financing inputs	Informal financing if any. Lack of vertical integration limits credit granting in the production phase	Informal financing if any or barter between producer and processor	Full cash payment expected in rural areas. Some producer financing where producer operates independently.	No financing between buyer and seller, as perishable commodity often relocated for retail network	Cases of grower credit exist by independent growers. Producer associations do not extend credit.