

Background paper for the
**Competitive Commercial Agriculture in Sub-Saharan Africa
(CCAA) Study**

**All-Africa Review of
Experiences with Commercial Agriculture**

Cotton Case Study

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All-Africa Review of Experiences with Commercial Agriculture

COTTON CASE STUDY

SECOND DRAFT

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This case study draws heavily on Poulton *et al.*, 2004 and on Tschirley, 2007

Cotton

Cotton is produced in almost half of the countries of Sub-Saharan Africa (SSA). It can be described as a major cash crop in at least 12 of these countries and has a lesser importance (but may have significant potential) in several more. Millions of households thus depend directly upon it as their main cash earning activity, whilst others benefit as labourers on cotton farms or in ginneries. As will be shown below, it is one of the few crops in which SSA has increased its share of world trade over the past 25 years, despite significant production expansions in other parts of the world, and, therefore, counts as one of SSA's major "commercial" agricultural success stories.

The Nature and Challenges of Cotton Production in SSA

Cotton is a smallholder-dominated crop in all SSA countries except South Africa. The main reason for this is the labour intensity of seed cotton production and especially of the harvesting process. Low-cost family labour is ideally suited to this task. Picking can also be done mechanically, but this would be higher cost than manual labour in most African contexts. Furthermore, mechanical picking results in higher vegetal matter (leaf and twig fragments) being mixed with the fibre - hence a less clean fibre - than when careful hand picking is undertaken. Historically, hand-picked cottons have commanded a premium over machine-picked cottons on the world market for this reason¹. However, as spinning machines have become larger and faster (more automated) in recent years, spinners have become increasingly exercised by other forms of lint contamination, such as the presence of polypropylene fibres from picking bags. These other forms of contamination are most common where seed cotton is hand-picked and especially where farmers do not face clear incentives to deliver high quality seed cotton. Thus, in recent years the world market has begun to give a price premium to machine-picked cotton over hand-picked (Tschirley, 2007).

Meanwhile, whilst it is important to keep picked seed cotton clean and dry prior to ginning, picked seed cotton is not highly perishable. There are thus no major post-harvest coordination challenges to encourage vertically integrated estate production by ginneries.

An appendix to this case study documents unsuccessful experience with three large-scale cotton/wheat schemes in Zambia in the 1980s and early 1990s, although none failed entirely because of the lack of competitiveness of large-scale cotton production *per se*.

Whilst cotton is an excellent smallholder crop, there are several challenges involved in supporting smallholder cotton production activities. These include:

- Farmers cannot retain harvested seed for planting the following season, as ginning is required to separate the lint (fibre) from the cotton seed. Thus, cotton companies have to find ways of supplying affordable, high quality seed to large numbers of smallholders each season. To keep costs down, many national cotton sectors have decided to return delinted seed from ginneries to farmers for planting the following

¹ The majority of the world's seed cotton is still hand-picked. Major exceptions to this include Australia, Brazil and the USA.

season². However, in order to maintain varietal purity, zoning regulations have to be in place and enforced, such that seed varieties are not mixed during ginning.

- Cotton production makes intensive use of chemical inputs, both pesticides (all countries)³ and fertilisers (mainly Francophone countries within SSA⁴). The only way to enable large numbers of poor smallholder households to afford reasonable quantities of these inputs is through input credit. However, recovery of such credit is notoriously difficult in SSA (Poulton *et al.*, 1998), particularly where strong competition in the output market makes interlocking of input and output transactions difficult.
- The complexities of cotton production, especially the large number of pests that cotton is susceptible to, make extension advice important if farmers are to raise productivity. Extension advice either has to be provided by a state agency (raising issues of funding and accountability) or by individual cotton companies. However, where the seed cotton market is competitive, incentives for the latter are subject to the same free-riding problems as incentives to provide input credit.
- Raising productivity of cotton production over time requires an ongoing programme of varietal research. There are economies of scale in such activities, meaning that it is rarely optimal for individual companies to undertake their own research programmes. However, there are issues of funding, management and accountability involved in industry-wide programmes, just as there are for public provision of extension advice.
- Finally, as already mentioned, it has become increasingly important in recent years to provide farmers with clear incentives to deliver high quality seed cotton at marketing time. High quality comes partly from production practices (using good quality seed and spraying appropriately), but primarily from harvest and post-harvest handling (waiting until bolls are mature before picking, only using approved picking bags and refraining from adulteration of the seed cotton in an attempt to make it weigh more⁵). Consistent grading and clear quality-related price differentials are required to encourage farmers to deliver high quality seed cotton. However, once again, experience shows that strong competition for seed cotton tends to undermine the enforcement of grading, even where a recognised grading system exists.

Poulton *et al.*, 2004 thus sum up the overall challenge in regulating an African cotton industry as being to achieve an appropriate balance between competition – to ensure that producers receive an attractive seed cotton price, amongst other things - and coordination – to tackle the challenges set out above.

² Zimbabwe and South Africa are rare exceptions where the seed system is commercialised and farmers are expected to pay the full price for certified seed each season.

³ Globally, cotton accounts for 10% of all pesticides – and 22.5% of all insecticides – applied in agriculture, on only 2.5% of cultivated land (<http://www.pan-uk.org/Cotton/cotabout.htm>).

⁴ The generally poor soils across much of West Africa necessitate the use of fertiliser on cotton, whereas in most of southern and eastern Africa cotton is grown fairly extensively in relatively land abundant areas. The major exception to this is Zimbabwe, where just under half the cotton producers apply inorganic fertiliser (Hanyani-Mlambo *et al.*, 2005).

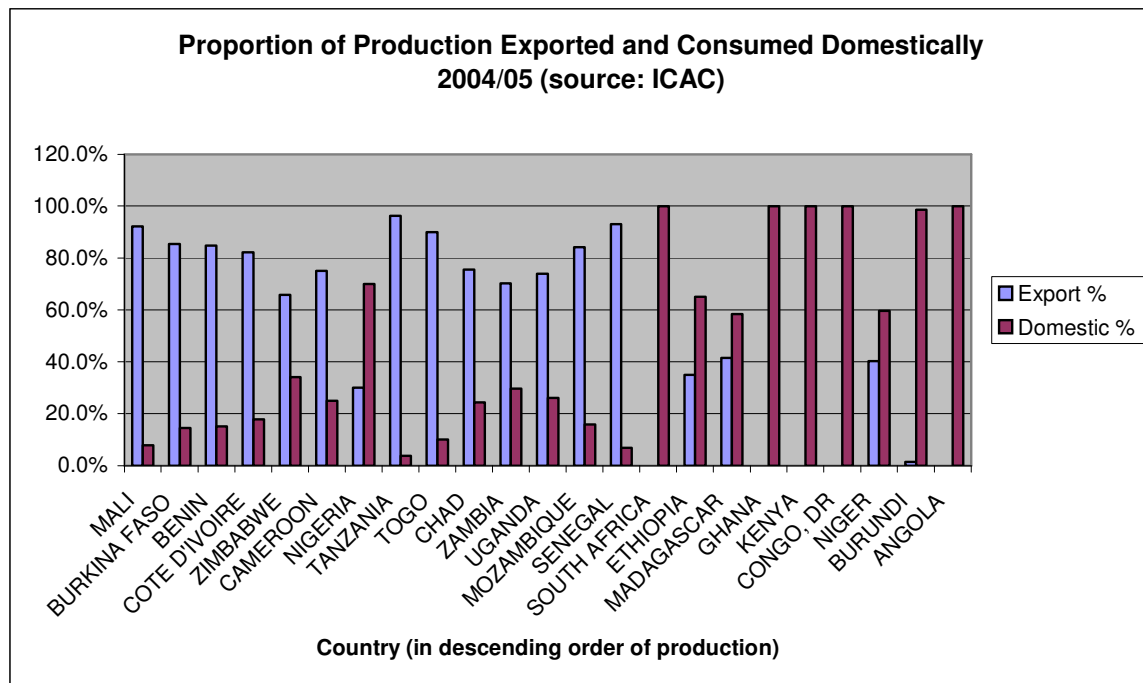
⁵ Where grading at primary marketing is lax, farmers may add water, sand or even rocks to increase the weight of their bales. Companies then have to employ people to pre-sort all the seed cotton before it is sent to the gin, so that hard items do not damage the ginning equipment. Sand can be removed using cleaning equipment, but this adds to the cost of the lint. Fibre that is left wet may discolour later.

Trends in Lint Production and Export

Figure 1 shows the proportion of cotton lint that was, on the one hand, exported and, on the other, consumed by domestic textile industries in various African countries in 2004/05. In the figure, the countries are ranked in descending order of production. With the exception of Nigeria, which has a large domestic textile market, all Africa's major cotton producing nations export the majority of their lint, whilst small-medium sized industries tend to supply mainly their local textile factories.

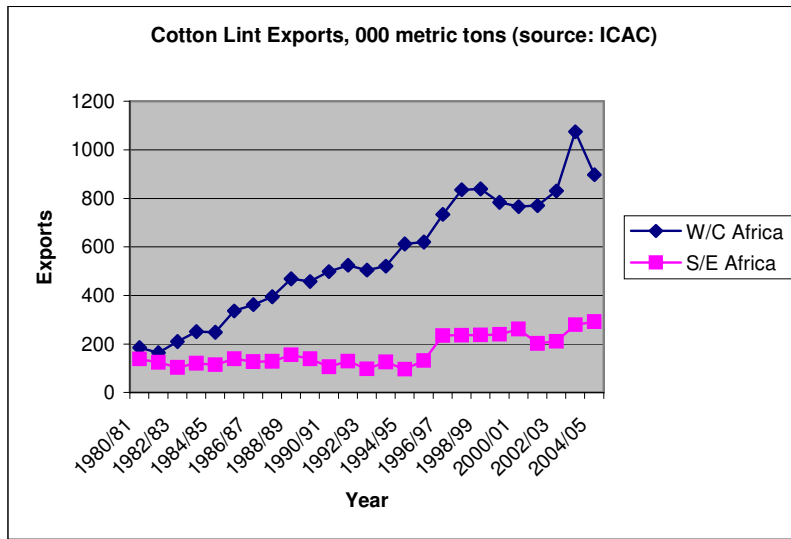
In the remainder of this chapter we focus on the cotton export story in SSA. This can be divided into two main parts: the experience of Francophone West and Central African countries and that of other cotton producing countries, found mainly in southern and eastern Africa. Both groups of countries have seen their share of (growing) world cotton lint exports rise over the past decade, although the increase in market share has been far more dramatic for the Francophone West African countries (Figures 2 and 3). Meanwhile, world lint prices have fallen dramatically over this period. The benchmark Cotlook A index averaged 73.4c/lb during 1980-89, but only 59.4c/lb during 1996-2005⁶.

Figure 1



⁶ These figures are means of annual average values provided by ICAC.

Figure 2

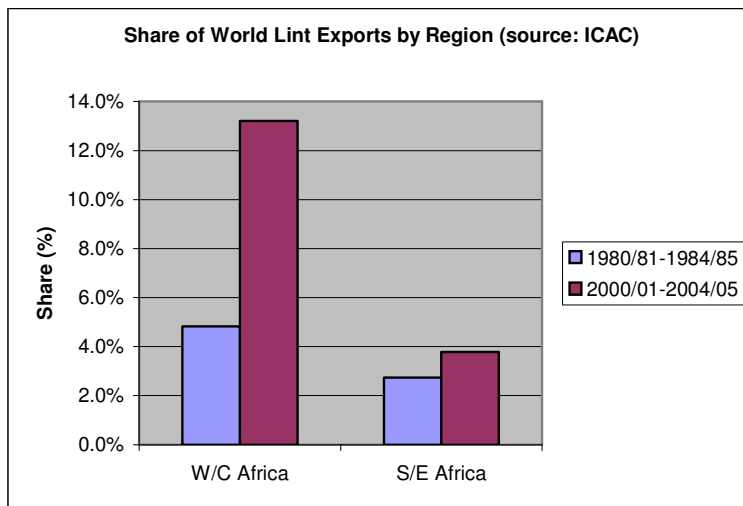


Notes:

W/C Africa includes: Benin, Burkina Faso, Cameroon, Central African Republic Chad, Côte d'Ivoire, Madagascar, Mali, Niger, Senegal, Togo

“S/E Africa” includes: Angola, Burundi, DR Congo, Ethiopia, Ghana, Kenya, Mozambique, South Africa, Nigeria, Tanzania, Uganda, Zambia, Zimbabwe. Ghana and Nigeria are included in this group because their experience of cotton sector development and reform has much more in common with the mainly Anglophone and Lusophone countries in southern and eastern Africa than with their Francophone neighbours in west Africa.

Figure 3



Not only is world cotton production currently at record highs and world prices low by historic standards, but projections are that prices will continue to be depressed for the foreseeable future⁷. Nevertheless, SSA's share of world production and exports is expected to continue to rise (FAO, 2004). This is because production in SSA enjoys the following advantages:

- Low-cost (family) labour is readily available, which is important for a labour-intensive enterprise. ICAC, 2004 thus find overall production costs (excluding seed costs and land rental) for seed cotton and lint to be amongst the lowest in the world in Tanzania and South Africa, the two southern / eastern African countries in their (admittedly limited) sample. Tschirley, 2007 find that the most productive producers have similar production costs per kg of seed cotton across SSA.
- SSA lint can still achieve respectable quality, where the right incentives are provided to producers. For many years, this was epitomised by Zimbabwe, which established a strong national grading system prior to liberalisation, then continued this through the 1990s. More recently, Zambia has established a strong reputation for high quality lint, such that on average its lint now commands a higher premium on the world market than Zimbabwe's. In some SSA countries, lint quality may also benefit from slow ginning speeds (a result of using old equipment, which is less efficient in other ways). Slower ginning places less stress on fibres prior to spinning – a factor that may become increasingly important as spinners move over to high-speed spinning equipment (Larsen and Poulton, 2005).
- Southern and Eastern African countries, being in the southern hemisphere (which only produces about 10% of global production), may receive a modest price premium for their early lint (Gibbon, 1999), if global stocks are not too high. Tanzanian and Ugandan roller ginned lint also has inherent characteristics that command a modest premium on world markets, if quality control is properly managed within the supply chain.

Offset against these advantages of producing cotton in SSA are the high internal transport costs, especially from landlocked countries (e.g. Burkina Faso, Mali, Zimbabwe, Zambia). However, sea freight costs can be quite modest, especially in the case of lint exports from east Africa to spinning mills in south Asia.

What is clear is that many major international companies recognise the importance of being able to offer African lints to their clients (spinning companies, who are now located principally in Asia) and have thus in recent years been either investing directly in African ginneries or strengthening their linkages with such ginneries, so as to gain access to reliable quantities of lint and to overcome quality problems (Larsen and Poulton, 2005). Gaining access to reliable quantities of lint often means investing in the smallholder supply base, through provision of technical advice, inputs and credit, as well as investing in the ginneries themselves.

⁷ Over the past two decades production has been fuelled by the rise of major new exporters (e.g. Australia, Brazil and most recently India) on the global market, plus technological improvements, including the rapid spread of GM cotton. It has also been artificially stimulated by subsidies paid to producers in a number of countries, most notably the US, EU and China (ICAC, 2002). International prices have been depressed by this increased production, as well as by competition in final product markets from synthetic fibres.

Francophone West and Central Africa

Francophone West and Central Africa contains seven major cotton producing countries⁸ (Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Mali, Togo), one medium cotton producing country (Senegal) and two minor cotton producing countries (Central African Republic and Niger; Madagascar is a third Francophone African country that falls into this category).

In all the major cotton producing countries, the development of the cotton industry in the second half of the twentieth century was promoted by enterprises operating a single-channel, monopoly system for input supply and seed cotton purchase. In the 1950s and 1960s development efforts were led by the French parastatal CFDT (Compagnie Française pour le Développement des Textiles). CFDT provided training and extension to smallholder producers, as well as supplying inputs, buying and ginning the seed cotton and marketing the resulting lint. During the 1970s the role of CFDT was taken over by national companies (e.g. Cotonchad in Chad established 1971, CMDT in Mali established 1974 and SOFITEX in Burkina Faso established 1979). The national government was the dominant shareholder in these new companies, but CFDT (restructured in 2003 to become DAGRIS: www.dagris.fr) retained a minority shareholding and continued to play a role in sectoral development. This included provision of technical assistance to the new companies – expatriate staff were gradually replaced by local staff - and the marketing of all lint. In addition, strong links were maintained with French cotton breeders, resulting in an ongoing supply of improved seed varieties for Francophone cotton sectors. These were characterised by high ginning out-turns, but typically produced a lint that was creamy in colour – an attribute not preferred on international markets – and, according to Yanggen *et al.*, 1998, only offered low returns to fertiliser use.

It is helpful to distinguish four phases in the development of the Francophone cotton sectors since the 1970s:

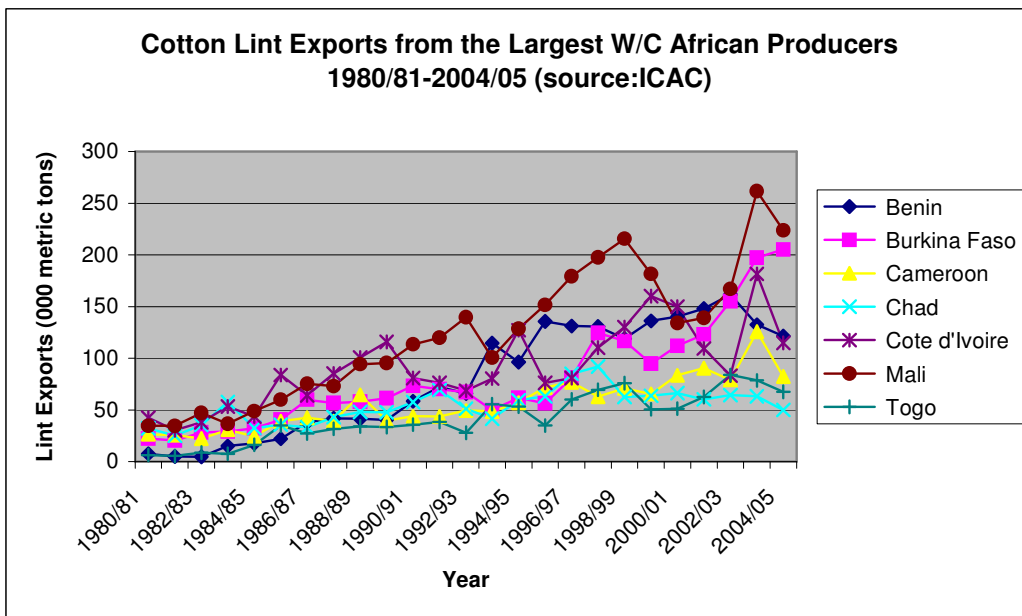
- Firstly, from the mid-1970s until the mid-1980s, the intensive production model that still characterises these sectors was developed. Yields rose strongly with the rate of fertiliser application such that, in the early 1980s, the average yield within the main Francophone sectors was twice the world average for rainfed cotton (Tschirley, 2007).
- Secondly, yields peaked around 1985 and have been fairly stagnant since – a major cause for concern for the ongoing competitiveness of these sectors. Although some production expansion continued, the sectors had to cope with the increasing overvaluation of the FCFA⁹ until 1994.
- Thirdly, the devaluation of the FCFA in 1994 provided new impetus to many of the sectors. Production expanded rapidly (Figure 4), but the latitude afforded by the devaluation (combined with high world prices for lint in the mid-1990s) meant that longer-term cost and productivity issues received less attention than they deserved.

⁸ Our definition of “major” is a fairly arbitrary one, but is used to permit comparison between W/C Africa on the one hand and S/E Africa on the other. For this report, we define “major” producing countries as those with a production level in 2004/05 in excess of 50,000 tons lint p.a., “medium” producing countries as those with a production level of 10,000-50,000 tons lint p.a. and “minor” producing countries as those with a production level below 10,000 tons lint p.a.

⁹ FCFA is the common currency of the Francophone West and Central African countries. Its value was fixed first in relation to the French franc and more recently to the euro.

- By 2000, world lint prices had fallen dramatically from their mid-1990s highs¹⁰. Farmers' organisations, which had been developing during the 1990s, became more assertive on seed cotton pricing issues just as the capacity of companies to pay higher prices declined. The squeeze on sector profitability was exacerbated further by the appreciation in the value of the FCFA against the dollar starting in mid-2002. In the past three seasons, most Francophone sectors have recorded major losses and have had to receive subsidies from their respective states. Initially, the profitability crisis was blamed on US and EU cotton subsidies. However, it is increasingly recognised that attention also has to be paid to the sectors' own costs and productivity. This most recent period has thus also been one of incremental reform in sector organisation.

Figure 4



Strengths of the Francophone Development Model

The Francophone development model had a number of desirable features. The vertically integrated single-channel system for input supply and seed cotton purchase enabled financial institutions to advance and recover credit to and from smallholder producers, permitting them to intensify their cotton production and also to increase production of food crops, such as maize¹¹. Over time, considerable investments were also made (with donor support) in building farmer organisations that, at the village level, took increasing responsibility for organising input distribution to cotton farmers and, at the national level, progressively strengthened the producers' voice in sectoral policy, most notably over seed cotton pricing. Finally, economies

¹⁰ On average, during 1999-2001 the Cotlook A index was only around 60% of its value during 1994-96.

¹¹ In some cases (for example, Mali and Cameroon), the companies were given responsibility for leading rural development efforts throughout the main cotton production zones. This included providing technical support for food crop production as well as building roads, schools and health facilities, partly out of profits generated through cotton production activities.

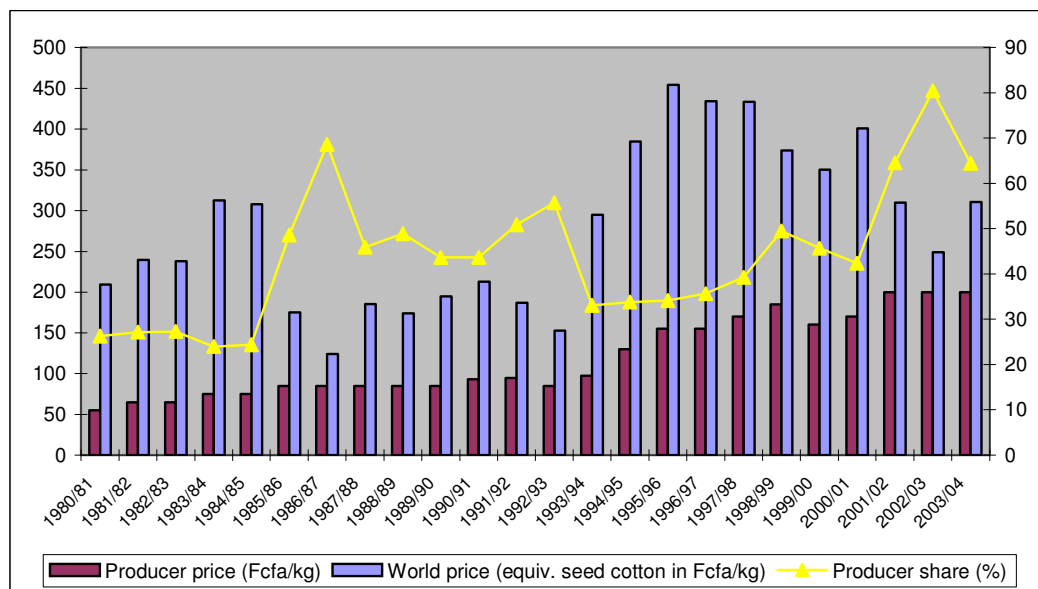
of scale were achieved both in research and lint marketing through the involvement of French breeders and CFDT respectively across the whole range of Francophone cotton producing countries (Tefft, 2004).

Figure 4 shows how lint exports from the major Francophone cotton producing countries have grown since 1980/81 as a result of these policies. Taking the period as a whole, the major success stories are seen to be in Mali, Burkina Faso, Benin and Côte d'Ivoire, with more modest but still strong growth in terms of tonnage in Cameroon and Togo (Togo particularly impressive in percentage terms).

Seed Cotton Pricing

Following our conceptual framework that highlights the importance of maintaining a balance between competition and coordination, one would expect the major weakness of the Francophone systems to be in the level of seed cotton prices paid to producers – and this has indeed turned out to be the case for much of the period under discussion. Taking the illustrative case of Mali, Figure 5 shows how the share of the f.o.b. lint price received by producers has evolved during the past two decades. In the early 1980s, this share was almost inexcusably low at around 30%. In the middle of that decade it was realised that this was a major discouragement to producers investing in cotton production, so seed cotton prices were raised to a still-modest level of between 40% and 50% of f.o.b. price. During the late 1980s and early 1990s, the FCFA became increasingly overvalued. Thus, the producer price in FCFA terms stayed fairly static, despite strong world prices (always expressed in US\$ terms) during 1989-90.

Figure 5: Producer Prices in Mali, 1980/81-2003/04



source: Briand *et al.*, 2006

Figure 5 shows that, following the FCFA devaluation in 1994, the producer share of the f.o.b. lint price in Mali was allowed to fall again to below 40%. Similar falls were also observed in other Francophone countries. The combination of the devaluation and four years of high world lint prices meant that there was a healthy increase in producer price, in both nominal and real terms, to which farmers responded strongly. However, as world prices fell later in the decade farmer organisations grew increasingly discontented with the low share of f.o.b. lint price received by farmers. Their internal advocacy for higher producer prices was matched by external criticism (especially from the World Bank) of CMDT's management of the monopoly production and marketing system. In 2000/01 around 50% of Malian cotton farmers refused to plant cotton in protest at low seed cotton prices, causing national production to fall dramatically. These combined forces led to agreements that raised the share of the f.o.b. lint price received by farmers, offsetting the impact on farmers of the falling world prices and encouraging continuing increases in production despite the historically low international lint prices.

At the same time in Burkina Faso stakeholders eventually reached agreement on a seed cotton pricing formula that guaranteed producers a 60% share of the f.o.b. lint price. However, the appreciation of the FCFA against the dollar since 2002, combined with low world lint prices, makes it impossible for cotton companies to make a profit if they are bound to pay producers 60% of the lint price.

The profitability crisis in Francophone cotton sectors focuses attention on costs and productivity within these sectors. Tschirley, 2007 find that ginning costs are considerably higher within Francophone sectors than within southern and eastern Africa, even after the higher level of services provided to producers by Francophone cotton companies has been taken into account. An important factor here is that Francophone sectors have historically invested in much higher cost ginning equipment than companies in southern and eastern Africa, some of which use cheap roller gins. However, it also appears that monopoly systems – especially systems that are subject to high levels of political intervention¹² – find it much more difficult to control costs than the more competitive industries of southern and eastern Africa.

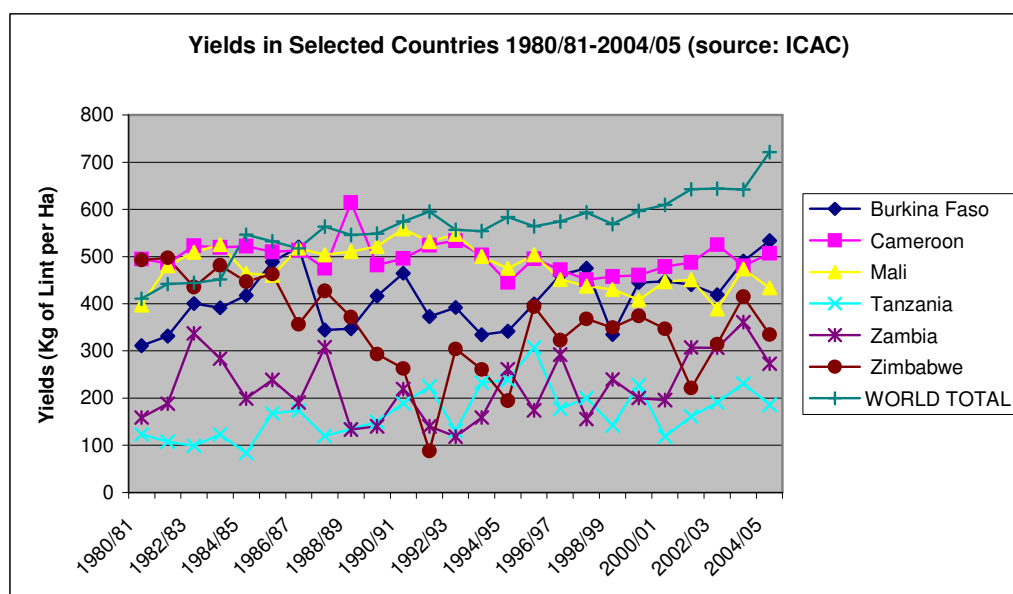
Seed Cotton Yields

Figure 6 compares yields in lint equivalent kg per hectare¹³ across selected countries. This shows that Francophone countries have consistently achieved yields higher than those achieved in other African countries. The intensive production system promoted by the single-channel systems in Francophone countries has made this possible.

¹² According to Tschirley, 2007, ginning costs are higher in Mali, where the cotton industry is arguably the most highly politicised, than in Burkina Faso, where some efforts have been made to reduce the role of the state in sector policy and planning in recent years. In turn, ginning costs are higher in Burkina Faso than in Cameroon, where the management of the monopoly cotton company SODECOTON is allowed to run its affairs with almost no interference from the state. Ginning costs in Cameroon are close to, although still a little above, those achieved in southern and eastern Africa.

¹³ To obtain figures for seed cotton yields, these figures need to be divided by the mean ginning out-turn in each country. This is typically somewhat higher in Francophone countries (40-44%) than in Anglophone countries (33-40%), so Figure 6 slightly overstates the difference in seed cotton yields across regions.

Figure 6



However, Figure 6 also shows that yields have been declining in Mali since 1990/91, whilst they have remained static in Cameroon over the same period. These countries are typical of the Francophone experience over this period. Only in Burkina Faso is there some recent evidence of yield improvement, although this still only takes the sector back to its mid-1980s peak. In other words, the dramatic production and export increases observed in the Francophone countries since the FCFA devaluation have been achieved almost entirely through extensification. Meanwhile, Francophone performance has been falling behind global average yields since the early 1990s (Figure 6)¹⁴. This has negative impacts on the competitiveness of Francophone African cotton, the profitability of cotton production and also the ability of increases in cotton production to contribute to poverty reduction (see below).

Reform of Francophone Cotton Systems

Over the past decade there have been fervent debates over the future of Francophone African cotton systems - one of the few major state systems resisting the general trend towards liberalisation in African countries. As already noted, criticism of the performance of the monopoly cotton companies has come both from external agencies and from domestic sources, especially from the growing farmers' lobby. Domestically, there have been two major foci of criticism: the low prices paid to producers, which are related to the perceived inefficiency of the cotton monopolies, and the plundering of cotton price stabilisation funds by politicians (in Mali, Burkina and elsewhere) in mid-late 1990s. During years of high prices, as in the mid-1990s, these funds should have been replenished, providing partial justification for the modest prices paid to producers during the post-devaluation period. However, when the very low world prices came in 2001-02, there was little in reserve to

¹⁴ Globally, average yield for irrigated cotton is roughly double that for rainfed cotton. The average yield across the Francophone African systems is now very similar to the global average for rainfed cotton.

support producer prices. In both Mali and Burkina, this has led from demands by farmers and others for the government to keep out of the management of the cotton sector, even though it is still the major shareholder in the dominant parastatal organisations.

Under pressure both internally and externally, governments in Francophone countries have taken a variety of approaches to reform. Here we briefly summarise three:

Benin was the first Francophone country to embark upon significant reform. The approach in Benin was to give responsibility for activities at different stages of the supply chain to separate organisations, then to establish coordinating institutions to ensure that the different stages of the supply chain function together. Thus, input supply was privatised first, starting in 1992, followed by ginning in 1995, then transportation. Multiple actors, mostly local firms, have now been allowed to enter these different stages, but the prices of different goods and services are still centrally determined, as is the distribution of seed cotton across ginneries. In 1999 the Cooperative of Provisioning and Management of Agricultural Inputs, a producer cooperative, was established to oversee the evaluation of input needs and the allocation of licenses to chosen input suppliers. Similarly, the Central Agency of Securitization of Payments (CSPR) coordinates the credit operations of cotton farmers, input suppliers, ginneries and banks. Overall sector coordination is the responsibility of the Interprofessional Association of Cotton (AIC), which brings together producers and ginners to monitor activities of all players in the sector, promote cotton research and negotiate with the government on cotton sector policy and with private transporters of seed cotton on prices (PADECO, 2006). As seen in Figure 4, sector performance during the early years of the reforms (which coincided with the FCFA devaluation) was encouraging. However, production and exports have subsequently levelled out and, since 2002/03, declined. The main perceived problem within the Benin sector at present is the continued interference of the government, which is seen to influence seed cotton prices and ginning quotas to favour the ex-monopoly SONAPRA (of which it remains the major shareholder), rather than to play an impartial regulator role for the sector (Gergely and Ravry, 2006; PADECO, 2006).

Burkina Faso has opted for a regional monopoly system in place of the previous national cotton monopoly. As the first stage of its reform programme, the government reduced its stake in the national cotton company SOFITEX, selling 30% to the Union Nationale des Producteurs de Coton du Burkina Faso (UNPCB), the national cotton producers' association, in 1998. Then in 2004 the operations of SOFITEX were restricted to the main western cotton producing zone, whilst the central and eastern zones (smaller, but with greatest potential for expansion) were granted as 8-year concessions to two private companies in which international cotton traders held a major stake¹⁵. The responsiveness to market signals, innovation (including in response to the long-term decline in soil fertility in cotton areas) and access to capital of the large international firms is already in evidence. In 2005/06 Burkina Faso overtook Mali and Egypt as Africa's top cotton producer. However, further modification of the rules of the game governing the concession system are still required if it is to successfully tackle the major problems associated with the previous monopoly system.

The process of identifying the two new international investors involved limited competition, but they still paid significant sums for their monopoly rights. This raises their costs of operation. Moreover, seed cotton pricing is done centrally and there has been some

¹⁵ A similar system was introduced in Côte d'Ivoire a little earlier. In Côte d'Ivoire the cotton producing zone was divided into three concessions, the management of which was given to the ex-monopoly parastatal, a company owned by a farmers' organisation and an international trading company respectively.

willingness on the part of the state to subsidise company losses caused by high seed cotton prices. As the biggest cotton company, SOFITEX's voice has prevailed in price setting negotiations. The state remains the biggest shareholder in SOFITEX, although there are plans to privatise. Under current conditions, it seems unlikely that the concession system will either inject much competition into the sector or exert pressure on companies to cut costs. For this to happen, SOFITEX's concession may need to be subdivided into two or three smaller zones. However, this in turn risks undermining economies of scale in lint marketing (Tschirley, 2007).

Mali has for much of the past 15 years been Africa's leading exporter of cotton lint¹⁶ and a symbol of the success of the Francophone African cotton model. Thus, despite the growing dissatisfaction in some quarters with the performance of CMDT, it has also been the country where there has been most resistance to sector reform. The government has now committed itself to reform along similar lines to those pursued in Burkina Faso, i.e. breaking up CMDT's monopoly into three or four concession zones, and the sector is evolving a pricing formula similar to Burkina's. However, there has already been significant slippage in the stated reform timetable, so there is no certainty when (or indeed if) these changes will be implemented.

Anglophone and Lusophone Africa

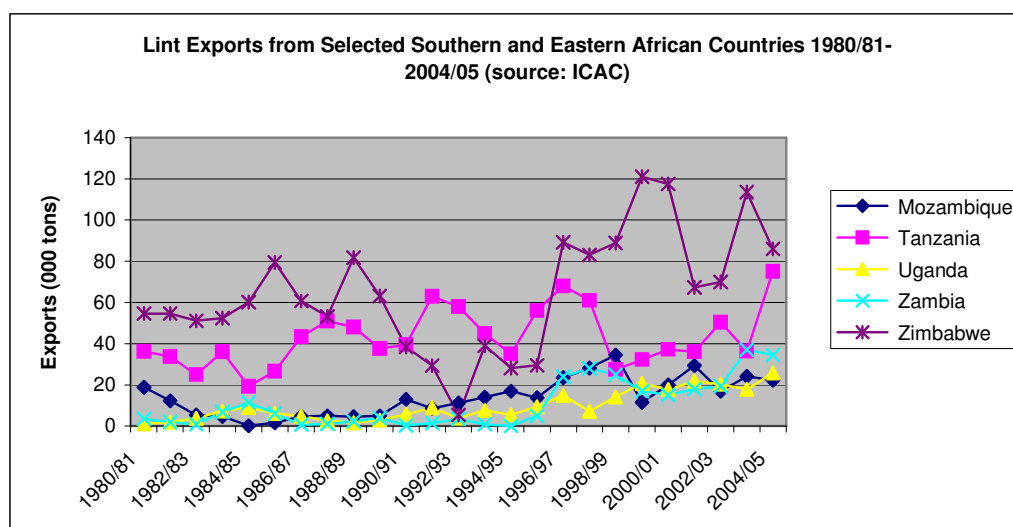
In this section we discuss the experience of the major exporters amongst the "other" SSA cotton sectors. No title (Anglophone and Lusophone, southern and eastern African) fully captures this diverse group of "others". For the purposes of this paper, their main common characteristic is that they have never received the level of organisational or technical input from CFDT or the French development cooperation that the Francophone sectors have received. Following our earlier classification (footnote 8), there are four major cotton producing countries (Zimbabwe, Nigeria, Tanzania, Zambia) within this group of "others", although none of these compare in size with Burkina Faso or Mali; five medium cotton producing countries (Uganda, Mozambique, South Africa, Ethiopia, Malawi) and five minor cotton producing countries (Ghana, Kenya, DR Congo, Burundi, Angola). In 2004/05 the combined lint production of these 14 countries was just under half that of the eleven Francophone countries listed earlier.

As might be expected, even the major exporters within this "other" group, all of which are found in southern and eastern Africa, have had more diverse development experiences than the Francophone sectors. With the possible exception of Zimbabwe, they all received less public investment prior to liberalisation than the Francophone systems. In general, they have also all recorded positive stories from liberalisation, as evidenced by the jump in exports around 1995/96 in Figure 2 – once local institutional arrangements have been devised to respond to common challenges.

Figure 7 provides further information on exports from five of the larger sectors since 1980/81.

¹⁶ Egypt produced more lint than Mali for most of this period, but utilises a much higher proportion of its lint production within its domestic textile industry.

Figure 7



Contrasting Experiences: Achieving the Competition and Coordination Balance Post-Liberalisation

In Zimbabwe and Zambia a single parastatal organisation was responsible for service provision to cotton producers (both commercial and smallholders), plus ginning and marketing, prior to liberalisation. In both cases, an orderly privatisation process was undertaken in the mid-1990s, resulting in a market dominated by two large players, plus one (Zimbabwe) or a few (Zambia) smaller players.

In Zimbabwe the pre-liberalisation Cotton Marketing Board (CMB) was generally an effective organisation, not least because it had to service demanding and organised large-scale commercial farmers, who produced 80% of national seed cotton output at Independence in 1980. It was profitable except for a few years in the late 1980s and early 1990s when it was forced by the government to supply lint to the local textile industry at subsidised prices (Jansen and Rukovo, 1992). Starting in 1980 CMB made a concerted effort to extend its service provision and seed cotton buying operations into communal areas. As a result, by 1990 smallholder producers contributed 50% of national seed cotton output. In 1992 CMB launched a credit scheme for smallholder producers, which was subsequently developed by Cottco (the privatised successor to CMB) and arguably formed the basis for Cottco's domination of the sector even after the entry of a major competitor, Cargill, in 1995 (Larsen, 2002). In the years after liberalisation, Cottco and Cargill continued to extend their smallholder supply base, including developing new production areas such as Gokwe. By 2000, commercial farmers contributed less than 10% of national seed cotton output, their most important role being as suppliers of the sector's certified seed. Figure 6 showed that average yields in Zimbabwe were lower during the 1990s than during the 1980s. This is because smallholder yields are little more than half those achieved by commercial farms. Amongst smallholder producers, however, there was no clear trend in yields through the 1990s, although the impact of droughts in 1992, 1995, 1997 and 2002 can be clearly seen from Figure 6.

The Cottco-Cargill duopoly managed to achieve a highly effective balance between competition and coordination during the first few years of liberalisation. They competed mainly through innovation in service provision to producers, but, whilst Cottco acted as price leader, their desire to expand the industry ensured that seed cotton prices were set at attractive levels. Meanwhile, a common understanding of the requirements for a successful cotton sector, plus informal coordination between the companies that was augmented by the existence of the multi-stakeholder National Cotton Council, ensured that Zimbabwe retained its international reputation for high quality lint and also that Cottco was able to achieve high repayment rates on its loans scheme.

The economic crisis that gained momentum in 2001 impacted the sector in unexpected ways. Initially exchange rate differentials on the parallel market widened faster than inflation, making for a real exchange rate depreciation. However, with so much uncertainty over both access to foreign exchange¹⁷ and the inflation rate, seed cotton pricing was hard to judge. In both 2002 and 2003, whilst the effective real exchange rate was heavily devalued, the two main firms made windfall profits. This, combined with the general difficulty of acquiring foreign exchange elsewhere in the economy, precipitated several new entries into the cotton sector, such that by 2006/07 there were 17 firms in competition. This led to modest upward pressure on the seed cotton price, but it has also created major difficulties for firms (especially Cottco) that need to recover input credit through seed cotton purchases. It also quickly led to an abandonment of the long-established system of grading at primary seed cotton purchase, which has undermined the average quality of seed cotton being delivered to ginneries. The major players in the sector realised that the previous informal coordination was no longer adequate for the new, intensely competitive environment, but so far their proposals for a new, formal regulatory regime have not received official approval. As of early 2007 it was still unclear whether the new competition was going to undermine the earlier success of the sector or give it a new dynamic.

Meanwhile, the smaller cotton sector in Zambia returned consistently high performance in the first decade post-liberalisation, especially once Dunavant had bought out Lonrho to become the dominant player in the sector in 1997. As is shown by Figure 7, problems were encountered in the late-1990s when the number of smaller companies in the sector increased, as a result of which side-selling of seed cotton to avoid credit repayment to the two main players also increased. Some of the smaller players exited the sector again when world lint prices fell and Dunavant further strengthened its credit repayment performance through the creation of independent “distributors”, contracted to provide both extension advice and credit (using on-lent funds) to fellow cotton producers whom they personally trusted to repay. Figure 6 shows that yields in Zambia have been rising steadily since the late 1990s, as the number of producers receiving extension advice and inputs on credit has increased. In addition, lint quality has improved, most notably through the outlawing of the use of polypropylene sacks by producers (an initiative led by Dunavant), leading to Zambian lint acquiring a useful premium over the Cotlook A index in recent seasons (Larsen and Poulton, 2005; Tschirley, 2007).

As in Zimbabwe, seed cotton prices were maintained at attractive levels in the late 1990s, whilst the main companies sought to expand cotton production in the country. However, the benefits of the growing lint premium have not been passed onto producers, leading to growing

¹⁷ Rules about what proportion of foreign exchange earnings could be changed into Z\$ at what rate have been altered several times during 2002-07.

dissatisfaction with producer prices in the past two-three seasons (Tschirley, 2007). Recent experience in Zambia thus lends clear support to the predictions of the competition-coordination analytical framework.

In both Tanzania and Uganda regional cooperative unions supplied inputs to producers and both purchased and ginned seed cotton output prior to liberalisation, even if the lint was then exported by a single parastatal. Production has always been “extensive” in both countries, with limited use of crop protection chemicals and no inorganic fertiliser. In Tanzania it has also always been very variable, as producers have switched in and out of cotton according to changing price relationships with competing crops (e.g. maize, rice, groundnuts). However, production was rising immediately prior to liberalisation, albeit at a high cost in terms of accumulated debts amongst the cooperative unions. In Uganda production collapsed during the years of misrule and internal conflict in the 1970s and 1980s. Post-liberalisation the decentralised cooperative-based sector structure gave way to a highly competitive sector, comprised of over 30 ginning companies, in both countries. This led to similar problems in both cases, most notably a collapse in pre-harvest service provision (extension advice and input supply), as it was too easy for firms to free-ride on the efforts of others. In Tanzania there were also prolonged difficulties in overcoming the problem of seed mixing, which occurred immediately after liberalisation as previous zoning arrangements collapsed, and quality also suffered from fierce competition for scarce seed cotton supplies.

Faced with the impracticality of achieving voluntary coordination across 30+ ginners, the responsible state agencies (Tanzania Cotton Board and Cotton Development Organization in Uganda) have had to craft creative interventions to solve these various problems. This has happened with plenty of trial and error in both cases. In Tanzania in 2002/03 the Cotton Development Fund (managed jointly by the Cotton Board, ginners’ representatives and representatives from two relevant Ministries) introduced a passbook system, a forced saving system that guarantees producers access to chemical and/or seed inputs according to the volume of seed cotton that they sold the previous season. This was one factor behind the dramatic rise in production witnessed in 2003/04 (and surpassed in 2004/05), albeit probably a less important factor than the high seed cotton prices paid in 2003 and some very good weather.

Meanwhile, since 2003 Uganda has been developing a zoning system, whereby 3-4 ginneries are given incentives to cooperate to provide extension advice and inputs in their designated area. In return for this investment, companies receive seed cotton quotas at harvest time. This raises the obvious potential disadvantage that price competition is eliminated. It could also lock in ginning overcapacity, which is a cause of high ginning costs in Uganda. However, so far the seed cotton prices paid since the introduction of zoning have been generous. This reflects the fact that Ugandan farmers have a range of alternative crops that they could grow and also that companies are still working hard to raise national production.

Tanzania and Uganda have, therefore, adopted different strategies in response to the common challenges posed by their highly competitive ginning structures. Tanzania has embraced competition and sought institutional arrangements, such as the passbook system, that alleviate the worst disadvantages of such a structure. Uganda, by contrast, has sacrificed competition in seed cotton pricing in an effort to raise yields. Tschirley, 2007 hypothesise that the difference in responses reflects the different agro-ecological endowment in the two countries. In Tanzania there is a vast area suitable for cotton production that has yet to be exposed to the crop, meaning that production could expand even under the current extensive model. In

Uganda, the potential cotton growing area is much smaller and, even within existing areas, producers are only going to continue producing cotton if their returns from cotton production can be raised above current levels.

Finally, Mozambique has operated a concession system – similar in principle to those introduced in Burkina Faso and Côte d’Ivoire – since the revitalisation of its sector began towards the end of its civil war in 1989. However, concessions in Mozambique have been granted without either any provision for periodic evaluation and re-tendering (they have been totally open-ended) or without any effective mechanism to generate an attractive price for producers. When, on two occasions, the poor performance of concession companies in the traditional cotton “heartland” of Nampula has led to encroachment by well-connected new companies, peace has been restored by carving out new zones from within existing concessions, thus further undermining the incentives that existing concession companies have to invest in their production zones. Overall the performance of the Mozambique sector has been well below that of the countries so far discussed (low yields, low quality and low seed cotton prices!), showing that, for a concession system to work well, clear “rules of the game” for concessionaires are key. On the other hand, outside the contested Nampula area, a number of international companies have developed new concessions (starting with the DAGRIS-owned CAN in the mid-1990s, but with other significant new entries since 2001). These are gradually developing a producer base and achieving both higher yields and higher quality than the Nampula-based companies.

Overall, the post-liberalisation experience in southern and eastern Africa shows the benefits of introducing private capital, management expertise and entrepreneurship to state-controlled sectors that were performing unevenly for a number of reasons. However, given the challenges involved in delivering high quality services to a large number of smallholder cotton producers, unregulated competition has been as much a “bad” as a “good” for these sectors. Instead, each sector has had to find its own way of balancing competition with coordination, so as to be able to provide credit and extension advice to producers and to maintain quality control, whilst also offering attractive seed cotton prices for producers to respond to. Sectoral structure has been the critical variable influencing what is likely to work in any given country.

Cotton Production, Growth and Poverty Reduction

The size and importance of cotton sectors, particularly in Francophone countries, means that several studies have been conducted to explore the contribution of cotton sector performance to growth and poverty reduction.

Minot and Daniels, 2002 explored the impact of international (US and EU) cotton subsidies on poverty in rural Benin, given their effect of lowering the seed cotton price that companies in Benin could afford to pay to producers. They estimated, using nationwide household survey data, that a 40% decline in the farm-gate price of seed cotton led directly to an additional 6-8% of rural households falling below their chosen poverty line. Poverty gap and poverty gap squared measures increased even more. An 8% rise in the poverty level was equivalent to an additional 334,000 people falling below the poverty line. Meanwhile, amongst cotton producing households, the average fall in income was estimated to be 21% and the increase in the poverty rate 22%. Because many of the cotton growers were located in two departments (Borgou and Zou), the overall direct impacts of the decline in the seed cotton

price were concentrated in these departments. These figures are “first round” effects only. In addition, they argued that there would be significant consumption multiplier effects from the lowered incomes of cotton producers, but that labour market impacts would be less severe than might at first be imagined, given the labour intensity of cotton production. Overall, they concluded that, “... there is a strong link between cotton prices and rural welfare in Benin. ... to the extent that fluctuations in world cotton prices are transmitted to farmers, they will have a significant effect on rural incomes and poverty.” (p50-51).

Using programming models for representative household types to explore similar questions for the case of Zimbabwe in 2002, Poulton, 2005 estimated that a 40% increase in the seed cotton price would have reduced the proportion of households within the relevant population (i.e. the cotton growing areas of the country) that lived below the local poverty line from 55% to 42%. The household models also suggest that provision of credit (or other services that give producers a clear “non-price” rationale for growing cotton) can assist in stabilising the output of national cotton industries in the face of fluctuating international lint prices.

Returning to the issue of market structure highlighted above, Poulton, 2005 also asks whether producers and companies respectively are better off within a more competitive or a more concentrated (but better coordinated) industry structure, if the latter can deliver input credit to producers but the former cannot. The conclusion is that, whilst households that are able to access credit fare better under a system that is able to deliver it (even when seed cotton prices are up to 40% lower as a consequence), poorer households that are not considered creditworthy even when credit is available do better under a more competitive system. In the Zimbabwe case, there would appear to be little to choose between the two systems in terms of direct poverty impacts on producer households. However, the “concentrated” model generated much higher production volumes, as credit stimulated a much stronger production response from the larger smallholder households than did a higher seed cotton price. Thus, from an industry perspective, the “concentrated” model appeared preferable. One would also expect higher production volumes to translate into higher multipliers in the local economy, meaning that the “concentrated” model may also be more beneficial from a poverty reduction standpoint.

For Burkina Faso, Grimm and Gunther, 2004 highlight the importance of the cotton sector to overall economic growth and also to poverty reduction within the immediate cotton producing zones, but observe that there are relatively few spill-overs in terms of poverty reduction to other rural areas (where 80% of the rural population live). At a micro level, Savadogo *et al.*, 1998 show that there can be positive interactions between cotton production and ownership of animal traction assets, with revenues from the former permitting acquisition of the latter, which in turn both permits higher yields and area expansion in cotton production and benefits household food production activities. Tschirley, 2007 argue that assisting producers to invest in animal traction technology is critical to enhancing the poverty reduction impact from cotton.

In partial contrast, Briand *et al.*, 2006 talk of the “paradox of poverty and malnutrition in cotton areas” in Mali. They show that cotton is a linkage-intensive sector within the national economy and, therefore, important for broader economic growth and also report qualitative evidence that cotton households are better off than the rural average. However, the 1989 and 2001 national survey data that they present show surprisingly that poverty and child health indicators are worse in the main cotton growing areas than in other parts of the country with less favourable agro-ecological potential. It is unfortunate that the 2001 survey occurred

straight after the cotton producers' strike of 2000 and may, therefore, have captured the negative effects of reduced cotton income. However, the data from 1989 and 2001 appear to tell a similar story. Briand *et al.*, 2006 are unable to provide a full explanation for this, but suggest that part of the explanation lies in the low profitability of cotton production for many producers, especially with the current declining yields, low world prices and yet high input costs. They suggest that cotton production has expanded over the past decade despite this low profitability, because households value the guaranteed market and access to inputs and credit that comes with cotton production¹⁸.

Relatedly, Wodon *et al.*, 2006 argue that subsidies to cotton producers (or other measures to increase the income of cotton producing households) would contribute to poverty reduction in Mali. However, whilst cotton producers appear to have few attractive agricultural alternatives to cotton, the poverty impact of changing cotton prices (or productivity) is mitigated by the fact that sales of cotton constitute only around a quarter of household income¹⁹. In addition, at a national level, only around a third of rural households grow cotton.

The finding that cotton production has a limited impact on poverty reduction in Mali may also owe something to the particular characteristics of rural household organisation in the cotton zones. Households can be extremely large (40 or more members) in these areas, permitting them to work correspondingly large landholdings. As noted above, this means that even apparently large areas devoted to cotton may only account for a quarter of total household income. It also means that any income generated has to be shared across a large number of household members.

Whatever the full explanation of the cotton "paradox", the work on Mali highlights the fact that, for cotton production to contribute to poverty reduction, sectors need to be able to raise yields and, perhaps more importantly, total factor productivity achieved by smallholder producers over time.

Meanwhile, participatory group exercises in Tanzania and Zimbabwe reported in Tschirley, 2007 found that the top smallholder cotton producers in both countries now rely almost exclusively on hired labour. Family labour is essentially a managerial input, enabling high returns to this labour to be achieved. At the other end of the spectrum, poorer producers value cotton production for the small quantity of cash income that it generates at harvest time, but many prioritise the hiring out of their labour during the production season. Thus, cultivation of their own cotton fields takes place in late afternoons or on days when they are unable to hire their labour out on other farms. Aside from seed purchase, they invest almost no capital in their cotton fields. Although the estimated returns to labour from their cotton activities are similar to, or below, an estimated casual daily wage, the two activities are not really substitutes. This helps explain why they persist in producing cotton despite achieving very low yields and returns.

¹⁸ Whilst input access may have encouraged producers to remain in cotton production despite falling returns, it is unlikely to have driven a large increase in production if returns were lower than those achievable from other crops. An insight from the household modelling work conducted by Poulton, 2005 is that, if returns to cotton are higher than those available for other crops, then households may expand cotton production when prices fall to compensate for the lost income from lower prices. It is the top third or so of producers who account for the bulk of cotton production and they are able to make a profit from cotton even when poorer producers apparently make losses (Briand *et al.*, 2006; Tschirley, 2007).

¹⁹ If only cash income is considered, then cotton production accounts for just over half of household income. However, if the imputed value of food production that is consumed within the household is also included, then the share falls to around a quarter.

Environmental and Health Impacts from Cotton Production

Two issues stand out here. Firstly, the high level of pesticide within many cotton systems (see footnote 3) can have significant impacts on human health, especially if pesticides are not applied in the recommended manner (commonly the case in Africa). Based on a survey of 280 cotton growers in two districts of Zimbabwe in 1999, Maumbe and Swinton, 2003 report that, "Cotton growers lost a mean of Z\$180 in Sanyati and Z\$316 per year in Chipinge on pesticide-related direct and indirect acute health effects. These values are equivalent to 45% and 83% of annual household pesticide expenditures in the two districts." Elsewhere, PAN-UK claim that the costs of days lost and medical expenses due to pesticide-related ill-health can be as high as the earnings that some households receive from cotton production. Horsley and Weisenfeld, 2005 point out that it is women who have to do much of the spraying of cotton in southern Africa, so are the worst affected by pesticides. Indeed, they do much of the work in cotton production, but rarely have much control over how the resulting proceeds (collected by men during seed cotton marketing) are spent.

Pesticide use in most of Africa has yet to reach the very high levels observed in some other parts of the world, although a 2004 survey of almost 300 producers in Zimbabwe did record an unexpected average of around 10 sprays per season (Hanyani-Mlambo *et al.*, 2005). Awareness of the health and environmental impacts of heavy spraying regimes in other contexts should focus minds on reducing pesticide usage within African cotton sectors – through greater promotion of scouting methods and perhaps adoption of Bt cotton varieties.

Secondly, intensive cotton production is attacked by some for its negative impacts on soil fertility. Thus, Moseley, 2006 argues that the cotton boom in Mali has been based on a mining of soil resources and is thus unsustainable. However, others see the access to fertiliser that cotton brings as allowing producers to intensify production without damaging the natural resource base on which cotton production brings. Indeed, they argue that residual fertility in the soil after cotton production is one of the reasons that maize production often does well in areas where cotton production is growing.

Lessons for Commercialisation from the Case of Cotton

The success of cotton sectors in a number of African countries over recent decades shows that cotton is a good crop for African smallholder producers if the necessary support services can be provided to assist their production activities. Sector organisation has been the key issue to get right here, with horizontal coordination amongst buying/ginning companies seeking to provide pre-harvest services to producers as important as competition in achieving strong sectoral performance. Whilst attractive seed cotton prices encourage a production response, support services are necessary, especially in an input-intensive activity such as cotton production, if producers are to achieve that response. Traditionally, Francophone African cotton systems have placed more emphasis on coordination (vertical and horizontal - a monopoly may be seen as horizontal integration!) than on competition. This has generated a number of benefits, but often at the cost of low seed cotton prices. Even within the concession systems, that appear to be the most promising post-liberalisation market structure, competition remains limited. However, the types of pricing formulae adopted in Burkina Faso and Mali may (with some additional refinement) offer a reasonable competition-substitute to

guarantee a fair price for producers. In southern and eastern Africa, systems that are essentially duopolies (Zimbabwe pre-2002 and Zambia) have performed best by many criteria, although seed cotton pricing remains an area of concern over the medium term (once companies have built up their supply bases). Meanwhile, the relevant government agencies within the more competitive systems of Tanzania and Uganda have had to seek creative ways of intervening in their sectors to assist the process of coordination where there exist 30+ ginners. This contrasting experience highlights the point that the appropriate role of government in supporting a national cotton industry depends critically on the sectoral structure that has evolved.

The cotton case study also highlights the importance of strong management and entrepreneurship. In Francophone systems the input from CFDT provided this for many years. However, the new private players are apparently more responsive to market signals than the national cotton companies that previously dominated these sectors. In southern and eastern Africa the benefits of private sector capital, management and entrepreneurship are clearly seen from post-liberalisation performance, subject to the caveat about achieving the competition-coordination balance if the benefits of liberalisation are to be realised.

This case study also highlights the importance of exchange rate management to sectoral performance. This is seen in the contrasting performance of the Francophone systems before and after the 1994 FCFA devaluation, as well as in the threat posed to continuing competitiveness from the currently overvalued FCFA. Exchange rate movements plus inflation were also critical to the dramatic change in sectoral structure in Zimbabwe between 2002 and 2004, with its uncertain consequences for the future performance of the sector. A sharp, short-term appreciation in the kwacha in 2005 also exerted downward pressure on the seed cotton price at a time when producer disquiet about pricing was growing.

Finally, investment in the development of new seed technology was one of the drivers of strong pre-liberalisation performance in Francophone systems. It is not clear whether the same economies of scale in research will be attainable post-liberalisation and, if not, what the impact of this will be. Varietal and other research has been a weak area for cotton sectors in southern and eastern Africa, with the exception of Zimbabwe. The organisation, funding and accountability of research systems in liberalised African cotton sectors is an area that deserves further attention.

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Appendix

Recipe for Disaster: The Zambian Large-Scale Irrigated Cotton/Wheat Experiment

By Geoff Tyler

Background

In the late 1980's three large-scale, irrigated, arable agricultural projects were promoted in Zambia to grow cotton (for export) and wheat (for domestic consumption):

Gwembe Valley Development Co Ltd²⁰ - promoted by a British entrepreneur, 1986

Masstock (Zambia) Ltd²¹ - promoted by an Irish agribusiness group, 1989

Nanga Farms Ltd²² - promoted by CDC in joint venture with the Government, 1989

The cotton/wheat crop rotation was an agricultural innovation for the country, although it had been implemented on a modest scale in neighbouring Zimbabwe. Traditionally cotton in Zambia was grown as a rainfed summer crop, (both by smallholders and on commercial farms) but because of the long period required to pick the cotton by hand, no other crop could be grown during the dry winter period. Wheat was grown as an irrigated winter crop on some commercial farms, usually in rotation with soya beans as the rainfed summer crop. Soya has a short growing and harvesting season and it allows adequate time to plant, and then harvest, the winter wheat.

The basic technological concept was that by mechanising the harvesting of cotton, and having a large equipment fleet capable of planting the winter wheat in a short period, it would be possible to achieve a good hectareage and good yields of both crops²³ thereby justifying the relatively high cost of installing irrigation.

The schemes were well supported both by the Government, and by development finance institutions (DFIs) who provided the bulk of the capital.

All three projects failed as cotton/wheat schemes.

This case study aims to understand the motivations and circumstances that allowed these schemes to get off the ground, to analyse the main reasons why they failed and to draw appropriate conclusions relevant to the promotion of large-scale agricultural ventures in future.

Government Motivations

During the 1970's the Zambian Government adopted a policy of state control of the economy. Most major industries, including the all-important copper mines, were nationalised, prices were controlled, imports subject to licensing restrictions. The currency was overvalued, which

²⁰ The author has acted as an expert witness for the sponsor in his legal disputes with co-investors

²¹ The author was a non-executive director of Masstock (Zambia) Ltd, 1989-93

²² The author was a non-executive director of Nanga Farms Ltd, 1989-93, and Chairman in 2000

²³ Cotton was expected to be the most valuable crop, so the objective was to plant 100% of the irrigable area with cotton in summer, and as much of the winter wheat area as possible before it became too late for achieve acceptable yields. The target was 60%, giving an overall cropping intensity of 160%.

allowed the government to “buy” cheaply the foreign exchange earned by the copper industry. Production of copper declined, foreign borrowing increased and a chronic foreign exchange shortage developed. Zambia in practice defaulted on its foreign debt by introducing a queuing system, whereby those wishing to remit money overseas deposited local currency with the central bank, to be converted to dollars as and when any became available, creating the so-called “pipeline”.

As a major mining country with 50% of the population living in the towns, Zambia had become dependent on food imports, especially wheat for bread and vegetable oil, so the foreign exchange shortage also had implications for food security.

During the 1980’s the Government began to give higher priority to agricultural development, both as a potential source of foreign exchange earnings, (e.g. from cotton and coffee) and as a form of foreign exchange savings via import substitution, e.g. wheat, oilseeds. Some major incentives were offered to foreign investors willing to invest in agriculture, including:

- support to acquire arable land on 99 year leases and to obtain water rights for irrigation
- the right to withdraw local currency deposited in the “pipeline” to finance agricultural projects – known as pipeline dismantling²⁴
- the right to keep 50% of any foreign exchange earned by the project, with which to directly purchase imported inputs, pay foreign managers, service debts and pay dividends.
- exemption from import duties during the development phase

Investor Motivations

The promoter of the **Gwembe Valley** project was employed in Zambia as the finance director of Hoechst (Zambia) Ltd, which distributed agro-chemicals in the country. He was familiar with the farming sector and with senior government officials as a result of Hoechst’s trading activities, but I believe he did not himself have direct agribusiness experience.

The promoter realised the potential to develop a major business for a relatively small personal outlay by taking full advantage of the Government’s financial incentives on offer. In particular the pipeline dismantling scheme.

In December 1985 he formed a joint venture with a US agricultural machinery supplier (Lumus Industries Inc) called Lumus Agricultural Services Company (LASCO) to promote the Gwembe project. GVDC was allocated a 2,500 ha block of irrigable land, with water rights, in an isolated area on the shores of Lake Kariba, called Sinazongwe. There had been little previous economic activity in the area because of the earlier de facto war with Rhodesia.

²⁴ Pipeline dismantling was particularly attractive for new investors. There was an informal market for Zambian debt, blocked in the pipeline, and in the late 1980’s it could be bought for about 15% of its face value. Thus 15cents would buy US\$ 1 of blocked debt. With permission for pipeline dismantling for an agricultural project, this US\$1 of debt could be converted to local currency at the prevailing official exchange rate, of say Zambian Kwacha (ZK) 12 to one US Dollar. A foreign investor with 15 cents could therefore obtain ZK12, implying a preferential exchange rate of US1 = ZK80. [12 divided by 0.15]

GVDC raised loan finance and minority equity stakes from the International Finance Corporation (17% shareholding) and DEG of Germany (12% shareholding). The DFIs made their investments in hard currency. Hoechst also took a minority shareholding of 10%.

LASCO was the majority shareholder with 60%, but was able to pay for its stake with a relatively small amount of dollars since in April 1986 it had obtained permission to buy blocked pipeline debt. Thus US\$1m was used by LASCO to acquire US\$5.8m worth of Kwacha from the central bank, which was then advanced to GVDC partly as equity (US\$2m worth of Kwacha) and partly as a dollar-denominated, short-term loan (US\$3.8m worth).

The promoter of the **Masstock** project was Masstock International, controlled by two brothers who had developed a dairy and farm management business in Ireland and the UK and then a successful, large-scale irrigated wheat project in Saudi Arabia. They were looking to develop irrigated wheat in other countries and received a personal invitation from the President of Zambia to assess the potential there. A feasibility study had already been prepared for an irrigated cotton/wheat scheme of 5,000 ha in the Chiawa area of the Zambezi valley, but the sponsor had decided to pull out. Water could be drawn from the Zambezi river. The land was sparsely settled, partly due to the earlier de facto war with Rhodesia. The site is not far from the capital, Lusaka, but the only access involved crossing the lower Kafue river by an unsafe pontoon. Masstock were encouraged to look at this prospect by both the Government and the IFC which had planned to back the previous sponsor. In spite of having no previous cotton experience Masstock were attracted to the concept and the site. They realised that they had to earn their own foreign exchange for commercial survival and so growing a crop such as cotton, for export, was an essential component alongside the wheat with which they were much more familiar. Masstock also realised the huge financial incentive that was available via the pipeline dismantling scheme for which they were declared eligible. They formed a local company Masstock (Zambia) Ltd to implement the project, in which Masstock International had a controlling 60% shareholding. IFC, CDC, USAID and OPIC provided loan finance, and CDC (10%), and a number of US agricultural equipment suppliers were minority shareholders. CDC financed its own minority shareholding on the basis of a Government approval to dismantle its own blocked pipeline debt²⁵.

The author of this case study promoted the **Nanga Farms** project on behalf of CDC. CDC, as a long-term investor in Zambia, had substantial debt service payments owing to it blocked in the pipeline. CDC did not therefore want to buy pipeline debt at a discount from another party, but to obtain approval for its own blocked funds to be released in the form of local currency for re-investment in export oriented ventures. Agriculture and project management were core elements of CDC's capability. CDC and the Government undertook a joint survey of run-down state farms with a view to identifying candidates for a 50:50 joint venture for rehabilitation and expansion. Nanga Farms was selected and a water right was granted. It covered nearly 9,000 ha. It was being used as an extensive cattle ranch but had potential for at least 1,600 ha of irrigated farming, being on the banks of the Kafue River. It was located in the heart of Zambia's main commercial farming area (Mazabuka) and near to Zambia's main sugar estate and factory (Nakambala). The cotton/wheat rotation was adopted as the core enterprise. Being at a higher elevation than the Zambezi Valley, cotton yields were expected

²⁵ To its credit, when the author of this case study submitted the proposal to invest in the Masstock project to CDC's Investment Committee it was initially rejected, on the grounds that sponsors lacked experience of working in Africa, the project was too capital intensive and too reliant on foreign borrowing. The Chief Executive of CDC was subsequently persuaded to accept the proposal on the ground that it was central to CDC's strategy to clear debt service arrears, although he remained sceptical about the project's chances of success.

to be a bit less than at Gwembe Valley and Masstock but wheat yields were expected to be higher. To spread risk and have an additional foreign exchange earning crop it was decided to also develop a 100 ha irrigated coffee estate. The cattle ranch was retained and stocking intensified. CDC agreed to provide foreign exchange to cover the cost of imported equipment and the Government “unblocked” CDC’s pipeline debts to meet local currency costs. There were no other investors.

The development agencies which supported either Gwembe Valley or Masstock or both, including IFC, DEG, USAID and OPIC, had a number of motivations. All were keen to invest more in Africa and agriculture but there was a shortage of credible projects. All were pleased that the Zambian Government, with its traditionally socialist leanings, was now encouraging private, foreign investment into the country. In addition USAID and OPIC funding was tied to the import of American irrigation equipment and agricultural machinery. In effect, the lending agencies wanted the projects to succeed. By and large the various project appraisals that they commissioned concluded that the cotton/wheat rotation could work, but that both the agronomic and economic aspects were high risk.

What Went Wrong?

Ultimately Gwembe Valley and Masstock (Zambia) went into receivership. Nanga Farms survived but switched from growing cotton/wheat to growing sugar cane and soya/wheat. There were some problems specific to each project and location, but there were also several common weaknesses.

Agronomic Aspects

Gwembe Valley and Masstock were both located in the relatively low, hot, dry Zambezi Valley. These conditions appeared ideal for growing irrigated cotton, as it is important that the cotton does not get wet once the bolls start to mature. The sites were too hot for ideal wheat growing since wheat needs a cold spell during the winter. It was anticipated therefore that cotton yields would be high and wheat yields modest.

In practice the cotton yields and quality were generally disappointing. Partly this was simply due to not making sufficient allowance for the ‘learning curve’. Cotton is a complex crop, especially regarding pest management, and it takes time to build up expertise and experience for a specific location. None of the projects had made provision for a pilot scheme to test the basic agronomic assumptions of the feasibility studies. In practice, no one was willing to pay for one.

There was provision in the Masstock project for the 5,000 ha scheme to be implemented in two phases, with funding for phase II conditional on certain performance targets being achieved during a phase I of 1,570 ha. Since the targets were not achieved, phase II did not proceed and this helped to limit the lenders’ financial exposure, but it was not the same as a well thought out pilot phase/trials period.

The average climatic data that had been used to assess the sites’ potential proved worse than useless. Statistics showing low average monthly rainfall during the summer months hid the fact that the rainfall pattern was erratic from year to year. The tendency was to have some short but extremely heavy bursts of rain. This created major erosion problems, wash-outs of

new plantings and if it occurred late in the season, damage to the maturing crop. There were also some long periods of high humidity, which encouraged pests and diseases.

Harvesting was mainly undertaken by machine because of the need to get the cotton out quickly and the wheat in. As anticipated the quality of machine picked cotton was less than that of hand picked. What had not been anticipated was the difficulty of maintaining the mechanical harvesters. There was no tradition of mechanical harvesting in Zambia and so no established stockists of spare parts or providers of maintenance services. The projects had to be self sufficient, which proved costly and difficult to achieve. As a result it was sometimes the case that picking of the cotton fell behind schedule so that either part of the cotton crop had to be abandoned or some of the hoped for wheat area had to be planted late or not at all.

To try and address the difficulties, Masstock started to grow marigolds as an alternative, shorter season, summer crop. The flowers once dried are exported and are a source of Xanthophyll, a colouring used in poultry feed. This appeared to be a promising prospect.

Economic Aspects

The schemes were highly capital intensive – the need for land development, irrigation and the large amount of machinery and equipment essential for the timely planting and harvesting of the two crops. To be economically sound the schemes had to achieve high production levels at relatively high crop prices.

In fact yields were modest and unfortunately the unstable world market price of cotton was relatively low when production came on stream²⁶. The cotton/wheat rotation did not deliver sufficient revenue to meet the cost of replacing the large amount of machinery and equipment needed to make the crop rotation work.

During the early 1990's there was a general liberalisation of the economy, including the lifting of exchange controls and floating of the currency. As a result it became possible to buy US Dollars by earning Kwacha. The standard soya/wheat rotation is much easier to manage and requires far less equipment. The fact that it did not generate foreign exchange was no longer a draw back. However both the Gwembe Valley and Masstock sites were too hot for good soya and wheat yields. Nanga Farms, being at a higher elevation, was able to gradually change over to this alternative by not replacing its specialist cotton machinery and equipment as it wore out.

Management Aspects

The projects were innovative and difficult to manage. Neither the sponsor of Gwembe Valley nor Masstock International had developed or managed an African agribusiness before. There was no experience of operating the cotton/wheat rotation in Zambia. Much of the machinery and equipment had never been used in Zambia. There was therefore a high reliance on expensive expatriate specialists and frustration at the practical difficulties of operating in a Zambian environment (bureaucracy, lack of back-up from equipment providers, power cuts, periodic shortages of fuel, transport, fertilizer etc). CDC did have agribusiness experience in Zambia (it had recently completed the Kaleya Smallholder Scheme) and recruited a general

²⁶ In 1990 the “real” price of cotton lint was 37% less than it had been 10 years earlier.

manager with experience of managing commercial farms in the country. However none of the CDC managers had had experience of the cotton/wheat rotation.

The high cost of the expatriate staff re-enforced the high risk nature of the gamble. Unless high yields and good prices were achieved the expense could not be justified, but if the expense was not incurred the scheme would not have worked at all.

Financial Aspects

CDC financed Nanga Farms with equity and flexible loans. When planned net income streams were not achieved there was no immediate financial crisis.

Both Gwembe Valley and Masstock were however highly geared – much more debt than equity. The two businesses were committed to early, large payments of interest and repayment of loan instalments. These payments were due to be made out of self-generated funds, i.e. project cash flow. Self generated funds were also intended, according to the financial plans, to finance the cost of machinery and equipment replacements and to contribute to the capital costs of developing phase II of the projects. In practice cash flow was far short of that anticipated and the projects fell into arrears on debt service payments i.e. the businesses made the classic funding mistake of having relatively inflexible cost streams but highly variable revenues streams.

The sponsors were not prepared to invest further substantial amounts beyond their initial investments once it was clear that it was unlikely that the projects were ever going to be able to repay their accumulated debts out of self generated cash flow. In practice, by using the pipeline dismantling scheme incentives, both sponsors had invested relatively small amounts of hard currency and so were, if absolutely necessary, able to bear the loss²⁷.

In addition the financial cost of the pipeline scheme to the Zambian Government came to be better appreciated, and the Bank of Zambia started to charge a fee for pipeline dismantling (in effect wanting a share of the discount at which Zambian debt traded compared to its face value). This seriously undermined the confidence of the sponsors in their ability to acquire Kwachas cheaply and so, in effect, to have their investment subsidised.

The Outcomes

The secured creditors placed GVDC into receivership in 1993, and the assets were sold by the receiver. There have been subsequent protracted legal disputes. The receiver has sued the sponsor, on the grounds that GVDC had paid US\$2.1m (in hard currency) to LASCO between 1987 and 1989 in part repayment of the LASCO Kwacha loan. LASCO sued the receiver alleging that the assets had been sold for less than fair market value.

After a period of fruitless negotiations, when the creditors tried to persuade Masstock International to invest more equity and Masstock International tried to persuade the creditors to write-off some of their loans, the secured creditors placed Masstock (Zambia) in receivership around 1994. The assets were put up for sale and the highest bid was made by

²⁷ The author did however observe that Masstock International made substantial efforts in terms of seconding specialist staff and working capital support to try and make the project work. They had pride in the project and an international reputation to maintain.

Masstock International, who were therefore able to regain control of the business for a fraction of the original cost, most of which had been met by the lenders. They converted the business primarily to producing marigolds. It was not a financial success and again failed to service its debts. In 2002 the local banks, who had provided working capital finance, called in a receiver for a second time.

As noted above, Nanga Farms phased out the cotton and phased in soya bean production. Around the same time, Zambia Sugar Company was privatised and the new owners, Tate and Lyle, embarked upon a major expansion of the nearby factory and needed more cane. As Nanga Farms already had an irrigation infrastructure in place it was offered a substantial quota to supply cane, which it accepted. Initially 1,000 ha was planted to sugar cane leaving 400 ha under soya/wheat rotation, while the coffee estate was expanded to 150 ha. Sugar cane proved to be a lower risk and more profitable crop and by the late 1990's Nanga was generating operating cash surpluses of approximately US\$1m p.a. This was not a high return, after 10 years of project development and operation, when compared with the US\$10.5m invested by CDC (partly using "blocked" funds), but nevertheless a sustainable business had been created providing employment for around 800 people.

In 2000 CDC put Nanga Farms up for sale. The highest and winning bid was received from the management. Subsequently the new owner negotiated a higher sugar cane quota and abandoned wheat/soya production completely, while expanding the coffee area to 200 ha.

Main Lessons

On the surface these schemes had attractive features:

- private sector entrepreneurs
- supportive government policies
- supportive development finance institutions
- utilisation of Zambia's abundant land and water resources
- modern technology
- export generation to earn much needed foreign exchange
- vital food production for import substitution

The key difficulty was that the technology was unproven under local conditions, and the ventures were multi-million dollar gambles. There is an obvious lesson about the need, when promoting major new ventures, not only for thorough research but also for on site crop trials and pilot schemes when new crops or new technologies are to be tried.

When a sponsor is not prepared to accept the cost or delays of pilot schemes and chooses to go straight into commercial production it may not matter if the sponsor is using his own funds. However in the case of Gwembe Valley and Masstock most of the funding came from development finance institutions and the Zambian government, via the pipeline dismantling scheme. These backers wanted the schemes to succeed but, in my view, had no justification for being confident that they would do so.

In effect the two schemes were too heavily subsidised and this allowed the sponsors to take a gamble that they would never have done had the schemes been financed with their own money.

In the author's experience, pioneering, large-scale, agricultural ventures rarely achieve their potential levels of output, productivity and cash flow surpluses quickly. It is foolhardy therefore to plan projects on the basis that there will be early and large flows of self generated funds that will be able to service any borrowed capital and help to meet the costs of future expansions.

As a development agency itself, and not a private entrepreneur, CDC as sponsor of the Nanga Farms project was able to take a long term perspective and to provide flexible funding. CDC had also selected a site that offered a range of cropping and livestock possibilities so that there were options to produce other crops should the cotton/wheat rotation prove financially unviable, as in fact it did. In addition, being in the middle of a commercial farming area, Nanga had access to staff and skilled workers used to the area and its conditions. This experience re-enforces the value, in all forms of business planning, of having contingency plans and options.

A further important lesson is to avoid basing major, long-term agricultural investments on transient, distorted economic policies. At the time that these projects were promoted there was such a shortage of foreign exchange in Zambia that fortunes could be made, sometimes illegally, by anyone with access to US Dollars. Several farming ventures emerged that involved producing exotic crops for export at very high cost in local currency terms, in order to earn dollars which, in practice, would be sold on the black market. Many of these ventures closed down as soon as the government adopted more liberal, rational foreign exchange policies.

The experience with the cotton/wheat schemes in Zambia does not imply that a country should never try to do something new, rather that those involved need to focus on the practical realities and avoid the temptation of wishful thinking. At the very least the management of such ventures should include people with experience of working in the new country and people with direct, practical experience of successfully working with the new crop and/or technology.

Neither does the experience imply that Governments and DFI's should not subsidise or support commercial, private sector projects. In the author's view many pioneering, agricultural projects warrant a degree of support. It does imply however that support should not be so great that the financial commitment made by the private sponsors is small relative to the value of the project.