

The Cotton Sector Of Tanzania

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Abstract

This country study is a background paper prepared for the comparative analysis of organization and performance of cotton sectors in Sub-Saharan Africa, a study carried out by the World Bank, with the objective of analyzing the links between sector structure and observed performance outcomes and drawing lessons from reform experience, in order to provide useful guidance to policy-makers, other local stakeholders, and interested donor agencies. It describes and reviews the cotton sector situation in Tanzania, where, after years of uneven growth, production of seed cotton reached record levels in 2004 and 2005. Importantly for wider policy debates, the Tanzanian cotton sector, unlike many others in sub-Saharan Africa, operates in a highly competitive market structure. With high local taxes and transport costs, the sector nevertheless pays reasonably attractive prices to producers. However, the competitive market structure has also presented significant challenges, especially in relation to seed supply, quality control and seasonal credit.

Following liberalization in 1994, the state largely withdrew from the cotton sector in Tanzania. However, when production fell sharply in the latter part of the decade, the state, in the form of the Tanzania Cotton Board, renewed its engagement in the affairs of the sector. Cooperation between a group of leading ginnerers and TCB has been central to the process of devising new institutional arrangements for the sector that facilitate coordination for seed multiplication and input supply (amongst other things) in a context of the highly competitive market for seed cotton. As long as the sector retains this highly competitive structure, there will be a vital role for TCB in ensuring that important strategic decisions are taken to promote sector development. Tanzania thus represents an interesting study in public-private collaboration and sector governance. It also represents an important test case of whether a competitive market model can be made to work for African cotton.

Author Affiliation and Sponsorship

Colin Poulton, School of Oriental and African Studies, University of London, UK

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**COMPARATIVE ANALYSIS OF ORGANIZATION
AND PERFORMANCE OF AFRICAN COTTON SECTORS**



THE COTTON SECTOR OF TANZANIA

Prepared for the World Bank by

Colin Poulton

Centre for Development, Environment and Policy
School of Oriental and African Studies, University of London, UK

and

Wilbald Maro

Economic Research Bureau
University of Dar es Salaam, Tanzania

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Abbreviations

ACE	Audit Control and Expertise
CDF	Cotton Development Fund
CPI	Consumer Price Index
DFID	Department for International Development
ECGA	Eastern Cotton Growing Area
ICAC	International Cotton Advisory Committee
ITMF	International Textile Manufacturers Federation
LSMB	Lint and Seed Marketing Board
MTEF	Medium-Term Expenditure Framework
NCU	Nyanza Co-operative Union
SGS	Société Générale de Surveillance
SHIRECU	Shinyanga Region Cooperative Union
TACOGA	Tanzania Cotton Growers Association
TCA	Tanzania Cotton Authority
TCB	Tanzania Cotton Board
VFCU	Victoria Federation of Co-operative Unions
WCGA	Western Cotton Growing Area

Executive Summary

After years of uneven growth, production of seed cotton in Tanzania reached record levels in 2004 and 2005. In 2004/05 cotton lint was Tanzania's top agricultural export earner. Importantly for development practitioners, the Tanzanian cotton sector, unlike many others in sub-Saharan Africa, operates in a highly competitive market structure. With high local taxes and transport costs, the sector nevertheless pays reasonably attractive prices to producers. However, the competitive market structure has also presented significant challenges, especially in relation to seed supply, quality control and seasonal credit.

In the early 1980s the government controlled the sector through the Tanzania Cotton Authority (TCA). However a disappointing overall performance led to the reintroduction of regional cooperative unions in 1986, which were responsible for cotton production, the provision of seasonal credit, and ginning in their respective regions for as long as the unions themselves could access the necessary finance. Export remained the responsibility of the successor to TCA, the Tanzania Cotton Marketing Board.

Although cotton production reached record levels in the 1991 and 1992 harvest seasons, many of the cooperative unions were soon beset with problems of corruption, poor management and, above all, financial mismanagement. Thus, in 1994 the government eliminated the monopoly held by the Cotton Board and the unions and allowed competition in cotton marketing and ginning. In the years immediately after liberalization, the state played a minimal role in the cotton sector. Production rose sharply in 1995 and 1996, prompted by the highly competitive nature of seed cotton purchase and the attractive world prices for cotton lint prevailing at the time. Competition between ginners ensured that an increased share of the (higher) export price was passed onto producers.

During the later 1990s world prices declined, the real exchange rate appreciated and the weaknesses in sector organization began to make themselves felt. As a result, production declined steadily, falling to around 100,000 tons in 1998 and 1999. This decline prompted TCB to call stakeholders together in 1999 for roundtable discussion to examine ways to improve the sector. This signalled a renewed engagement by the state in the affairs of the cotton sector.

Central to the process of devising new institutional arrangements for the sector has been cooperation between a group of leading ginners and TCB. Their working relationship is integral for the growth of the sector. As long as it retains its highly competitive structure (i.e. numerous ginners, none of them dominant), there will be a vital role for TCB in ensuring that important strategic decisions are taken to promote sector development.

An example of institutional innovation considered by the report is the introduction of the passbook system, a sector-wide intervention designed to enhance producers' access to crop protection chemicals through "forced saving". Unlike company credit systems, which are often undermined by highly competitive output markets, the passbook system is fully compatible with a competitive market model. Its introduction (by TCB/CDF) is believed to have been one contributory factor towards the major resurgence in cotton production in 2004 and 2005, the other major reasons being attractive seed cotton prices in 2003 and good rains.

Tanzania thus represents an interesting study in public-private collaboration and sector governance. It also represents an important test case of whether a competitive market model can be made to work for African cotton.

1 INTRODUCTION

Tanzania and Cotton

Tanzania competes with Zimbabwe to be the largest cotton producer in Southern and Eastern Africa. Cotton is one of the three most important export cash crops in the country, along with coffee and cashew. After struggling for several years, production of seed cotton in Tanzania reached record levels in 2004 and 2005, and cotton became the largest export earner of all agricultural commodities in the country. In both these years, Tanzania ranked as the 6th largest lint producer in Africa, according to ICAC data.

From a wider perspective, the Tanzanian cotton sector is interesting because, of all the liberalised cotton sectors in Africa, it has been closest to the competitive “ideal”. Despite high local taxes and transport costs, the sector does pay reasonably attractive prices to producers. However, the highly competitive market structure has also presented significant challenges, especially in relation to seed supply, quality control and seasonal credit.

Tanzania and Uganda present contrasting responses to the common challenges of seed supply, quality control and seasonal credit. In Uganda, where the number of ginning companies is similar to Tanzania, current arrangements impose major restrictions on competition. In contrast, there is widespread support for maintaining a competitive market model in Tanzania, although there is also recognition that this can only be effective if a public agency - currently Tanzania Cotton Board (TCB) and the associated Cotton Development Fund (CDF) - plays a complementary “coordination” role. In turn, this raises interesting questions about the accountability of the public agency to sector stakeholders. Tanzania thus represents an interesting study in public-private collaboration and sector governance. It also represents an important test case of whether a competitive market model can be made to work for African cotton.

The Tanzanian cotton sector has yet to make significant progress on restoring overall cotton quality to pre-liberalisation levels. However, in the area of input supply, a recent institutional innovation of interest is the passbook system, a sector-wide intervention that is designed to enhance producers’ access to crop protection chemicals through “forced saving”. Unlike company credit systems, which are often undermined by highly competitive output markets, the passbook system is fully compatible with a competitive market model. Its introduction (by TCB/CDF) is believed to have been one contributory factor towards the major resurgence in cotton production in 2004 and 2005. However, we conclude that the system can only make a limited contribution to the intensification of cotton production in Tanzania.

Following two years of record harvests, an extended drought devastated seed cotton production for the 2006 season. In this light the following report will consider whether institutional arrangements, such as the passbook system (or seasonal credit), can help to stabilise cotton production levels.

2 HISTORICAL BACKGROUND AND REFORM PROCESS

2.1. The Tanzanian Cotton Sector Prior to Liberalisation

A detailed history of the Tanzanian cotton sector is provided by Maro and Poulton, 2002. Initial investments in ginning were made by missionaries, British companies and Asian businessmen (based both in Uganda and Tanzania). The latter came to dominate the sector during the 1930s. The colonial government regulated the operations of the Asian ginners, invested in seed varietal research to support the sector, distributed seed free to producers and announced floor prices at the start of the season. In 1956, the Tanganyika Lint and Seed Marketing Board (LSMB) was registered to deal with the export of seeds and Lint. Prior to this, the marketing of lint abroad had been undertaken by the Uganda Lint Marketing Board on behalf of Tanganyika.

The colonial administration also made efforts to promote co-operatives within the WCGA due to concerns about deteriorating relationships between the traders and cotton farmers. By the mid 1950s, a total of 400 co-operative societies and 20 co-operative unions had been formed in different parts of the Lake Province, including the apex Victoria Federation of Co-operative Unions (VFCU). During the 1950s these institutions began to make inroads into the crop purchasing activities of the Asian traders through market competition.

In the three decades after independence (1961), government policy sought both to give cooperatives greater control over cotton marketing (to the exclusion of private traders) and to extend political control over cooperatives in WCGA and more generally. The result was highly bureaucratic and inefficient cooperative unions. In 1976 all cooperative unions were liquidated, the Tanzania Cotton Authority was given responsibility for all post-harvest activities related to the cotton crop in Tanzania and all ginneries, oil mills and related assets became state property. However, disappointing performance under this arrangement¹ led to the reintroduction of regional cooperative unions in 1986, which were responsible for cotton production, the provision of seasonal credit, and ginning in their respective regions for as long as the unions themselves could access the necessary finance. Export remained the responsibility of the successor to TCA, the Tanzania Cotton Marketing Board.

Initially the re-introduction of the unions was well received by their affiliate societies. Their performance was regarded as satisfactory and financial institutions were willing to lend to them. However, many of them were soon beset with problems of corruption, poor management and, above all, financial mismanagement. Thus, although cotton production reached record levels in the 1991 and 1992 harvest seasons (see Figure 2 below), this came at a high cost in subsidies to loss-making cooperative unions. Reliable data are hard

¹ Members of Parliament and producers alike criticized the cotton and other crop authorities for being corrupt, inefficient and distant from the farmers they were intended to serve. These weaknesses were reflected in the heavy losses the authorities incurred and also the dwindling output for major crops like cotton because producers became highly demotivated.

to come by, but it also appears that the quality of Tanzanian lint was declining prior to liberalisation, as inefficiency in the cooperatives led to the relaxing of grading standards (Gibbon, 1999; Baffes, 2002; World Bank / Government of Tanzania, 2004).

2.2. Sector Liberalisation and Subsequent Institutional Evolution

Baffes, 2002 (p1) summarises the major steps in the liberalisation of the sector as follows: “Before the 1990s the Cotton Board and the cooperative unions handled all marketing services for the industry, including the provision of seed and other inputs. In reforms introduced in 1990 the Cotton Board provided fee-based services to the cooperative unions instead of buying the cotton itself. In 1992 price controls were relaxed, and indicative prices were announced instead of prices at which cotton was purchased. The biggest change came with the Cotton Act of 1994, when the government eliminated the monopoly held by the Cotton Board and the unions and allowed competition in cotton marketing and ginning.” Liberalisation can thus be dated as beginning in 1994.

In the years immediately after liberalization, the state played a minimal role in the cotton sector. As already noted, production rose sharply in 1995 and 1996, prompted by the highly competitive nature of seed cotton purchase and the attractive world prices for cotton lint prevailing at the time. Competition between ginners ensured that an increased share of the (higher) export price was passed onto producers. World Bank / Government of Tanzania, 2004 (p26) report that, “For cotton, average growers’ share of export prices increased, from 41 percent in six seasons prior to reform to 51 percent in six seasons following reform.” Competition also resulted in prompt payments being made for seed cotton, whereas pre-liberalisation payments had sometimes been delayed for “several months” (World Bank / Government of Tanzania, 2004, p26).

However, the sector did not perform well either in terms of maintaining quality control or assisting producers to access high quality inputs (both of which are discussed in more detail below). During the latter 1990s, world prices declined², the real exchange rate appreciated and the weaknesses in sector organization began to make themselves felt. As a result, production declined steadily, falling to around 100,000 tons in 1998 and 1999 (Figure 2). This decline prompted TCB to call stakeholders together in 1999 for the first of what became annual stakeholders’ conferences, at which measures to turn around the fortunes of the sector were discussed. The stakeholders’ conferences had a high political profile, with attendance by MPs from cotton producing zones and, initially at least, chairmanship from the President, Prime Minister, or Minister. This signalled a renewed engagement by the state in the affairs of the cotton sector.

² The A Index had actually hit a peak in the 1994-95 marketing year, then declined year-on-year until 2001, with only a brief respite in 2000. It fell below its 30-year average level in 1998 and subsequently has only briefly returned to that average level in late 2003.

3 OVERVIEW OF THE COTTON SECTOR: SEED COTTON PRODUCTION

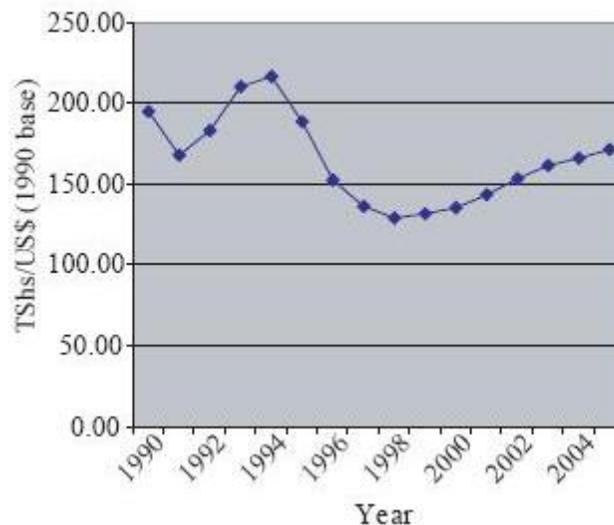
3.1. Key Macro-Economic Factors Affecting the Sector

The Government of Tanzania has achieved considerable success in both macro-economic stabilisation and growth in recent years. Inflation (measured by the CPI) averaged 27% p.a. in 1994-96, 12% p.a. in 1997-99 and 4.3% p.a. in 2003-05. Meanwhile, annual per capita GDP growth has been positive since 1995 and rising steadily, exceeding 3% p.a. in most years since 2000. Nevertheless, Tanzania remains one of the poorest countries in the world.

The combination of successful macro-economic stabilisation and an increasingly competitive banking sector has also permitted interest rates to fall. The average medium and long term lending rate was 21% p.a. during 1998-2000, but had fallen to an average of 14% p.a. during 2003-05 (source: Bank of Tanzania; www.bot-tz.org). This has reduced the costs of finance faced by cotton companies.

An important factor affecting the growth and profitability of the agricultural sector, and especially tradable commodities such as cotton, is the real exchange rate (Delgado and Minot, 2000). Figure 1 shows trends in the real exchange rate in the years since cotton sector liberalisation. This shows that there was a significant appreciation in the real exchange rate in the mid-to-late 1990s, which limited companies' ability to pay attractive prices to producers. The situation has improved since, although the real exchange rate is not back to the level prevailing at liberalisation.

Figure 1: Real Exchange Rate



Sources: www.bls.gov/cpi/cpid0608.pdf;
www.bot-tz.org/Publications/EconomicIndicators/EconomicAndFinancialIndicators.htm

3.2. Seed Cotton Production

Within Tanzania, cotton is grown predominantly in the north-west of the country. The so-called western cotton growing area (WCGA), which comprises Shinyanga, Mwanza, Mara, Tabora, Kagera, Kigoma and Singida regions³, accounts for 99% of national production. However, within this, it is Shinyanga and Mwanza regions that account for the majority (c.85%) of production. Although in recent years the Tanzania Cotton Board (TCB)⁴ has been making efforts to encourage production in other parts of the WCGA, this has so far made little impression on the share of production accounted for by Shinyanga and Mwanza (see Appendix Table 1).

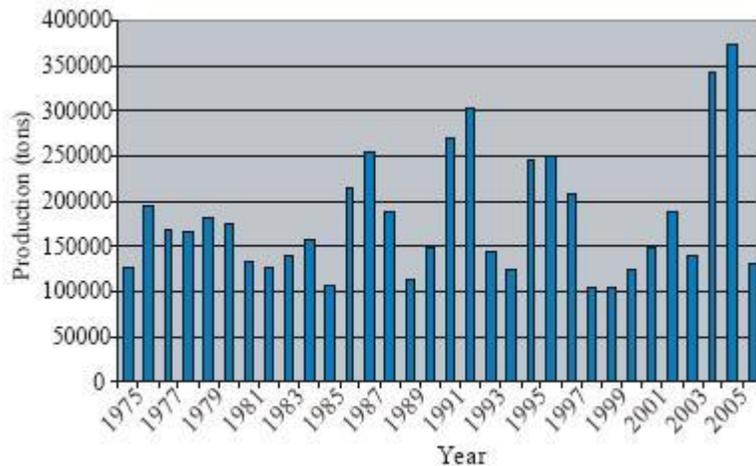
Meanwhile, the so-called eastern cotton growing area (ECGA) has traditionally been centred on Morogoro region, but also officially includes Pwani, Tanga, Iringa, Kilimanjaro, Mbeya and Manyara. Production in ECGA has always been much smaller than in WCGA, partly due to higher pest pressure and partly to the alternative economic opportunities open to producers in these regions. When the cooperative-owned ginneries in ECGA ran into financial difficulties, production in the ECGA also collapsed. Whilst numerous companies invested in new ginneries in the WCGA after liberalisation, similar investment was not forthcoming in the ECGA. For some years TCB itself has run ginneries in the ECGA to try and encourage a recovery in cotton production there. However, despite this and some interesting initiatives – a contract farming scheme in Morogoro region and a group of farmers in Kilimanjaro that contract gin on their own account - there has as yet been no major recovery in production in ECGA.

Figure 2 shows production of seed cotton in Tanzania over the past 30 years. The most striking feature of this figure is the degree of volatility, which, if anything, has been increasing over time. Production reached a record high in harvest year 1992 – only two years prior to liberalisation. However, the subsequent fall put financial strain on the cooperative system that extended credit to producers for input access. There was another increase in production immediately following liberalisation, but again this was short-lived. The six years of lower production from 1998-2003 prompted fundamental questioning of the benefits of liberalisation in Tanzania. They also caused key stakeholders to work together more closely to try to address the main weaknesses identified in the functioning of the liberalised sector.

³ These regions have similar agro-ecological conditions for cotton production.

⁴ From 1993 onwards the regulation of the sector was undertaken by the Tanzania Cotton Lint and Seed Board (TCL&SB). The Tanzania Cotton Board was created in 2001 with the passage of the Cotton Industry Act. However, it was only in 2005/06 that the government finally cleared the outstanding debts of TCL&SB “thereby paving the way for the newly formed Tanzania Cotton Board (TCB) to embark on its new defined role of regulating and promoting the subsector more efficiently and effectively” (Tanzania Cotton Board, 2005). For convenience we refer to both organizations by the short-hand TCB.

Figure 2: Seed Cotton Production in Tanzania, 1975-2006



Source: TCB data

Given the pessimism surrounding the Tanzanian cotton sector at the turn of the millennium, it is useful to draw together the factors thought to have contributed to the dramatic increase in cotton production in Tanzania in 2003/04 (then sustained into 2004/05). Three factors dominate, although it should be pointed out that no quantitative analysis has been conducted to measure the relative contribution of each to the production increase.

Firstly, cotton producers in Tanzania are highly responsive to changing (relative) prices of competing crops. (In Mwanza and Shinyanga, cotton may compete with maize, rice and/or groundnuts for land, labour and capital). They apparently do not have any way of assessing likely future prices, so base decisions on what area to plant to which crop on the previous season's price. Thus, Delgado and Minot, 2000 (p58) found that the price elasticity of cotton supply (responding to the previous season's price) was 1.00. The world lint price rallied temporarily in late 2003, just as seed cotton was being purchased from producers, and much of this price rise was passed onto them (see section 4.7 for a more detailed discussion of seed cotton pricing). Many producers, therefore, determined to increase their area planted in 2003/04.

Secondly, their resolve to do this was, in many cases, strengthened by the introduction of the passbook scheme in 2003. For the first time, a useful proportion of producers could plant cotton in 2003/04 confident that, when the time came to obtain chemicals (which have to be applied during the "lean season"), they had a basic entitlement through their passbooks, irrespective of their cash situation at the time.

Using data from the 2004 household survey, Maro and Poulton, 2005b show that producers who had produced seed cotton in 2002/03 expanded their area on average by 17% in 2003/04, whilst many households who had not produced cotton in 2002/03 re-entered in 2003/04, albeit with acreages on average less than half of those of "existing" producers.

Thirdly, the 2003/04 season was ideal weather-wise. The evidence of a bumper crop in the ground, plus (to some degree) the benefit of the passbook system, encouraged producers to increase their chemical application (see Table 7 for data), protecting the harvest that was available and at the same time contributing to an increase in quality.

After the dramatically improved performance in harvest years 2004 and 2005, the disappointing production in 2006 can be attributed almost entirely to poor weather. There are high hopes of a rebound in 2007 – as long as the season is not too wet! – but it is clear that the degree of inter-year volatility in production remains uncomfortably high. Later we discuss whether the passbook system could help reduce this volatility and, if so, how.

3.3. Number of Producers, Area Cultivated and Yields

Table 1 presents official data on cotton producers and area planted in recent years. However, none of these figures are offered with any confidence and various reports (e.g. Baffes, 2002; Maro and Poulton, 2005a) have emphasised the importance of improving data collection for the sector.

Table 1: Estimated Number of Cotton Producers and Area Planted 1998-2007

Production Season	Estimated Number of Producers	Estimated Area Planted (ha)	Average Area Planted Per Producer (ha)
2006/07	350,000	561,287	1.60
2005/06	300,000	281,434	0.94
2004/05	434,986	482,000*	1.11
2003/04	500,000	452,000	0.90
2002/03	460,000	291,000	0.63
2001/02	370,000	338,400	0.91
2000/01	350,000	420,000	1.20
1999/00	320,000	182,000	0.57
1998/99	310,000	250,000	0.81
1997/98	380,000	180,000	0.47
Average	377,500	343,812	0.91

Source: TCB data, except * = ICAC estimate

Note: The cotton production season in WCGA lasts from November to June. The years in this table refer to the production season (November to June). By contrast, TCB present their data by marketing seasons, with each marketing season running from July 1st to June 30th. Thus, the 2003/04 production season generates the 2004 harvest, which is recorded by TCB as the figure for the 2004/05 (marketing) season.

TCB are currently considering a registration scheme for cotton farmers (with each farmer having his/her own registration number). In the meantime, since the advent of the passbook system, the number of passbooks distributed has become the most reliable way of estimating the number of producers engaged in cotton production. It is this, rather than any “real” change in cotton production activity in the country, that accounts for the decline in recorded numbers of producers since 2002/03.

Each year some passbooks that are distributed to district level are not taken up by farmers and our understanding is that the figures in Table 1 are not fully adjusted for this. (See

footnote 32 for an example of low uptake). We might, therefore, take 350,000 as an upper-bound estimate of the number of active cotton producing households in Tanzania.

Putting this figure in context, the estimated population of Tanzania in 2006 was 37 million⁵. With around 70% of the population living in rural areas and an estimated average rural household size of 5.8 persons, up to 8% of rural households may be involved in growing cotton. However, in the major cotton producing zones, the vast majority of households grow cotton, especially in years when sentiment towards cotton is positive.

Figures on area planted are even more problematic than those on number of producers. They are derived from estimates made by extension agents in the various production regions⁶, but are really little more than guesswork. An annual sample survey is needed to arrive at more reliable figures (M.Mtunga, *pers.comm.*).

Given the problems with the figures for both number of producers and area planted, we suggest that the figures on average area cultivated per producer should be treated with extreme caution. Baffes, 2002 (p1) summarises the TCB orthodoxy (the figures in Table 1 notwithstanding), which is that “Cotton is produced primarily by smallholders on farms of 0.5 to 10 hectares (the average is 1.5 hectares).” This is over 50% more than the average recorded in Table 1, which is consistent with the view that the number of producers has historically been over-estimated.

Table 2 reports figures from the 2004 household survey in Kwimba and Bariadi districts undertaken by the DFID-funded “Competition and Coordination” project⁷. In this survey, there were 213 cotton producers for whom data on area planted to cotton and seed cotton production in 2004 were available. Note, however, that both pieces of information were supplied by the respondent, not measured or independently verified by the enumerators.

⁵ The 2002 census recorded a total population of 34.6 million of whom 73% lived in rural areas. Average household size was 4.9, but mean household size in rural areas was higher than in urban areas. In the regions comprising the western cotton growing area, average household size was 5.9 (<http://www.tanzania.go.tz/census/census/index.html>).

⁶ Two sets of estimates are made: an initial set that form the basis for the quantities of seed distributed by TCB to each production district (with 7kg of seed allowed per acre to be planted), then an adjusted estimate that is supposed to reflect actual area planted.

⁷ A total of 280 households were surveyed, out of which 235 (85%) had one or more members growing cotton during the 2003/04 production season. Data on both area planted and seed cotton production are available for 213 of these. (Some respondents recorded “don’t know” in response to one or other of these questions). A total of 301 households had been surveyed in the same villages in 2002, 151 in Kwimba and 150 in Bariadi. Of these, 221 (73%) had one or more members growing cotton during the 2001/02 production season. The majority of households surveyed in 2003/04 were households that had been surveyed in 2002. However, due to difficulties in tracing original households, 26 new households from Bariadi district were added in 2004. Kwimba and Bariadi Districts were originally chosen as survey sites as they represent “middling” producing districts within Mwanza and Shinyanga regions respectively. Findings from the survey are thus believed to be indicative, if not fully representative, of trends within the sector as a whole.

Thus, the figures on area planted in particular could be subject to quite a wide margin of error.

Table 2: Production by Farm Size

	Count	Total Area Planted (ha)	Total Seed Cotton Production (kg)	Weighted Average Yield (kg/ha)	Count	Share of Area Planted	Share of Seed Cotton Production
4+ ha	13	116	51,597	444.8	6%	30%	19%
2-3.9 ha	52	128.4	112,236	874.1	24%	33%	41%
1-1.9 ha	62	84.3	65,760	779.9	29%	22%	24%
0-0.9 ha	86	54.6	42,958	786.6	40%	14%	16%
Total	213	383.3	272,551		99%	101%	100%

Source: 2004 household survey in Kwimba and Bariadi districts

Table 2 indicates that 6% of cotton-producing households grew four or more hectares of cotton. Three of the reported acreages in this category were in excess of 15ha (i.e. not really smallholders), but the very low yields recorded by all three suggest that areas planted were subject to over-estimation by respondents.

The mean area planted to cotton within this sample was 1.8ha and the median was 1.2ha. These figures are considerably in excess of the figures calculated in Table 1, but are comparable with the TCB orthodoxy summarised by Baffes, 2002.

Table 3 presents data on yields derived from the area estimates presented in Table 1 and the production figures shown in Figure 2. The figures jump around due to the fluctuations in estimated area planted contained in Table 2. As noted above, there is reason to believe that many of these fluctuations do not represent real trends on the ground.

Table 3: Average Seed Cotton Yields 1998-2005 (kg/ha)

Harvest Year	Average Seed Cotton Yield (kg/ha)
2006	464
2005	781
2004	756
2003	480
2002	557
2001	353
2000	679
1999	402
1998	583
Average	562

Source: calculated from Table 1 and Figure 2

The conclusion reached by both Baffes, 2002 and Maro and Poulton, 2004 was that a credible ballpark yield figure for the Tanzanian cotton sector is 500 kg/ha. This, of course, is a low figure even within Africa, let alone internationally. Moreover, these authors found no evidence of any trend in yields, nor any qualitative evidence (e.g. introduction of new seed technology or increase in input use) that would suggest that

there should be any such trend. Instead, weather conditions were believed to be the major determinant of inter-annual variations around the 500 kg/ha mean.

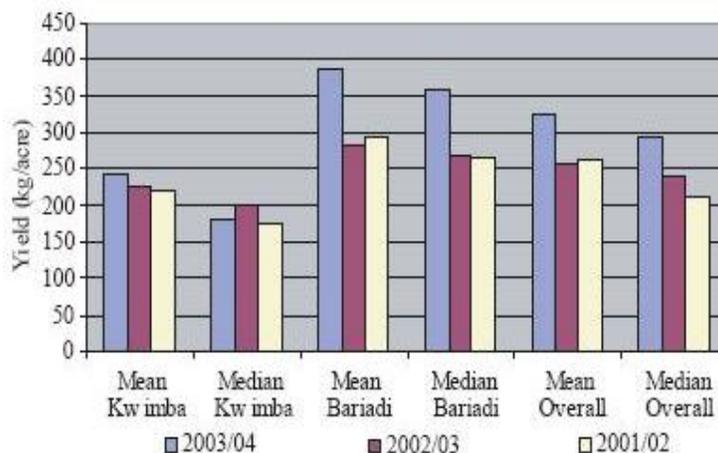
However, the yield figures for 2004 and 2005 - around 50% higher than the 500 kg/ha average so far quoted – are credible. The reasons for the record production in these seasons will be discussed below. For now, we note that the 2003/04 production season was an ideal one weather-wise and that producers were able to access more crop protection chemicals than they had been able to hitherto. Hence, yields were unusually high. The 2004 household survey in Kwimba and Bariadi districts recorded a mean yield figure of 711 kg/ha for this season, which may be an under-estimate due to the assumed over-estimation of areas by households with the largest areas planted to cotton. The high production achieved in 2004 further enhanced producers’ access to inputs for 2005 through their passbook entitlements, contributing to another record harvest.

By contrast, the 2005/06 season was badly affected by drought and this is reflected in the poor yield shown in Table 3.

Returning to Table 2, the variation in yield by farm size category is not statistically significant, and we have already noted that we believe the low yield for the largest size category to be a matter of data error. On the other hand, it is worth noting that sector average yield figures can hide significant variation across production areas. Taking Kwimba and Bariadi districts as an example, soil fertility and availability of alternative cash crops (most notably rice) are both greater within Bariadi. As a result, cotton yields in Bariadi tend to be higher than those in Kwimba.

Figure 3 presents the yield estimates for the 2002, 2003 and 2004 harvests derived from the 2004 household survey. The two-year recall figures for yields in the 2001/02 production season are somewhat different from those collected in 2002, especially in Kwimba. Nevertheless, from this figure we observe that: yields in the 2003/04 production season were significantly higher (99% confidence level) than those in either of the two preceding seasons; this effect was mainly due to increases in Bariadi in 2003/04; yields in Bariadi are significantly higher (99% confidence level) than those in Kwimba.

Figure 3: Seed Cotton Yields in Kwimba and Bariadi, 2001/02 - 2003/04



Source: 2004 household survey

3.4. Seed Cotton Purchase and Ginning

One of the major distinguishing features of the Tanzanian cotton sector is the large number of buyers, most of whom also own ginneries, who compete to purchase seed cotton⁸.

Baffes, 2002 (p4) reported that, “In 1994/95 [the first year of market liberalisation] some 22 private companies started trading cotton, and 8 new private ginneries were constructed.” Some of the private buyers without ginneries sought toll ginning contracts with cooperative unions that owned ginneries. However, at this time, the cooperative unions remained confident of government support to compete against the private buyers, so were generally reluctant to enter into such toll ginning contracts – and were certainly not going to consider selling ginning facilities to them. This encouraged the expansion of private ginning capacity, despite the existence of under-utilised capacity at ginneries owned by cooperative unions.

Another factor that has encouraged the expansion of private ginning capacity, and which has perhaps assumed greater importance with the passage of time, is that much of the ginning equipment owned by the cooperative unions is old and/or poorly maintained. Thus, it is difficult to achieve good quality lint. Seed coat fragments are a particular problem when this old equipment is used.

Since liberalisation, the sector has experienced considerable entry and exit of firms from year to year. Whilst some of this is completely new entry or final exit, it is not uncommon for ginneries simply to be left unutilised for a season or two, either because the company concerned has financial difficulties (e.g. cannot obtain the necessary working capital) or because it decides that buying prices are too high to make buying worthwhile. Maro and Poulton, 2002 reported TCB data on the number of ginneries in existence in the WCGA and whether or not they were operational as of August 2002. A total of 48 ginneries were recorded, but only half of these were classed as operational at the time. Even amongst the ginneries owned by private companies, only 63% were operational (Table 4).

Table 4: Ginneries in the WCGA as of August 2002

Ginnery Owned by	Operating	Not Operating	Total
Cooperative	6	12	18
Private Company	19	11	30
Total	25	23	48

⁸ In addition to the numerous small ginning companies in Tanzania, plus the few buyers who seek to toll gin, there are some small-scale cotton traders who do not gin raw cotton. These traders take truckloads of seed cotton to nearby ginneries and seek to sell it there (probably avoiding some taxes and levies in the process). Whilst their behavior becomes the topic of debate if regulation of ginneries or potential changes to the marketing system is discussed, we do not currently have any figures on which to base an estimate of their share of total seed cotton purchases. However, we suspect it to be small. Neither the 2002 nor the 2004 household survey picked up evidence of sales to traders other than recognized buyers.

Source: TCB data

Note: The 30 private ginneries recorded in the table were owned by 22 companies.

Table 5 shows that no firm has succeeded in establishing dominance, or even consistent leadership, in the sector. As an example of short-term entry and exit from the sector, Cargill re-entered the sector in 2004, having “mothballed” its two ginneries prior to that, and was the biggest single buyer in 2004 and 2005, but then dramatically scaled back its purchases in 2006 when it judged that seed cotton prices were unprofitably high. Nyanza Cotton Oil was also a new entrant into the sector in 2004 and similarly scaled back its purchases sharply in 2006.

Table 5: Buyer Concentration in the Tanzanian Cotton Sector, 2003-2006

Harvest Year	Number of Buyers Purchasing Seed Cotton	CR5	Cooperative Share of Purchases (%)	Top Five Private Buyers
2006	29	0.45	0%	Kahama Cotton Co, Afrisian, Kahama Oil Mill, Diamond, Gaki
2005	28	0.41	3%	Cargill, Virian, Alliance, Afrisian, Jambo
2004	36	0.35	9%	Cargill, Alliance, Virian, Nyanza Cotton Oil, S&C
2003	26	0.40	7%	S&C, Alliance, Diamond, Virian, Birchand

Source: TCB data

Tanzania Cotton Board, 2005 explain the lower number of buyers in 2005 compared to 2004 as follows: “Some buyers and two out of four existing Regional Cooperative Unions could not register for the [2005/06 marketing] season ostensibly due to liquidity problem [sic] arising from financial losses incurred during the 2004/05 marketing season.” However, whilst some firms inevitably incur losses in a highly competitive market place, the current dynamic within the sector is definitely one of expansion, encouraged by the record harvests of 2004 and 2005. The latest TCB data on ginneries show that seven companies expanded their ginning capacity in 2006 alone and that these new investments represented an additional 26% ginning capacity for the sector. During our field visits in January 2007 we encountered firms (Jambo and Cargill – there may well be others) with ambitious expansion plans in Tanzania. It remains to be seen whether this will produce any consolidation in buying patterns over the next few years.

It is worth emphasising that the ongoing investments in ginning capacity provide compelling evidence of private sector confidence in the future of the Tanzania cotton sector. The sector surprised many observers (the current authors included) by just about hitting its self-proclaimed target of 750,000 bales of cotton lint in the 2005/06 marketing season. Now, the government has set the sector a new target of 1.5 million bales by 2010. It appears that many ginners share the belief that there remains considerable scope for production expansion in Tanzania. They point out that WCGA covers a huge geographical area, as well as encompassing 40% of the national population. Whilst there are huge logistical challenges in operating across such a vast area, if they can manage this, then there are many more households who could still grow cotton.

Turning to the ownership of ginning companies in Tanzania, a noteworthy fact is that only three are owned by major international firms: Cargill, Copcot (owned by the international trading firm, Paul Reinhart) and BioRe (an exporter of organic cotton, owned by Swiss textile company Remei AG). Over the past four seasons these firms have between them accounted for 7-15% of seed cotton purchases in Tanzania, the variability being largely the result of changes in Cargill's buying behaviour.

Most of the firms in the sector are, therefore, owned by Tanzanians of African or Asian origin⁹. As will be argued below, the links that the sector is able to establish with both equipment suppliers and lint buyers in Asia are a potentially important asset in the highly competitive (and increasingly Asia-focused) international cotton market.

Meanwhile, 2006 was the first year in several decades in which cooperative unions did not feature as cotton buyers in Tanzania. Cooperative unions had retained a market share of around 40% until 1999, mainly because the government still provided guarantees that enabled them to receive credit from commercial banks. However, since 2000 the level of government support has dwindled and they have accounted for a greatly reduced share of seed cotton purchases. The evidence collected during the "Competition and Coordination" project indicated that cooperative unions were only able to participate in the seed cotton market at the early stages of the season, when prices were lowest. A few farmers sold a proportion of their seed cotton to cooperative buyers, believing that it was in some way good that they remained in the market. Others sold to them believing that they would give a "fair" price, only to be disappointed when they realised that what they actually received was the floor price. Moreover, as already noted, the ginning equipment belonging to the cooperative unions is ageing and often poorly maintained, hence impacting lint quality.

With numerous private companies jostling for market share within the sector, there is little justification for a "counter-weight" to uncompetitive private trading practice¹⁰. There should be no loss in farmer welfare from the disappearance of the cooperative unions from the market.

Finally, arriving at a reliable estimate of ginning capacity and utilisation within the sector is complicated by a number of factors, including:

- The unpredictability from season to season as to which private gins are going to be in operation;
- Uncertainty as to how one should assess the status of the cooperative ginneries that still appear on official lists.

⁹ Alliance is a Kenyan company of joint Arab and Asian ownership.

¹⁰ One possible exception to this statement is in the area of weights and measures used during seed cotton buying. However, cooperative buyers have been unable to exert any systemic influence over these practices and there are, besides, other possible ways of tackling the problem of cheating on weights and measures.

TCB data show that, as of the end of 2006, there were a total of 61 ginneries in WCGA, of which 20 are owned by cooperatives¹¹. Assuming a 181kg bale size for all ginneries (as TCB statistics tend to do)¹² and a six-month ginning season, the combined capacity of these 61 ginneries is sufficient to produce 268,745 tons of lint. This capacity is almost equally split between roller and saw gins.

If we only consider the ginneries owned by private companies¹³, these have a combined capacity sufficient to produce 205,097 tons of lint (i.e. 76% of the total). Of this capacity, 61% is saw gins.

Using a 35% ginning out-turn ratio, the private ginneries would be able to gin around 586,000 tons of seed cotton during a six month ginning season. This is well in excess of the record harvests achieved in 2004 and 2005.

Taking the private ginning capacity as installed in 2005, the record 2005 seed cotton harvest represented about 80% ginning capacity, assuming a six month ginning season. In stark contrast, with the subsequent increase in ginning capacity, the poor harvest in 2006 only represented just over 20% ginning capacity. However, whilst one would expect such a low capacity utilisation to be very costly in financial terms, the low cost of ginning equipment installed in Tanzania means that this is not actually the case (section 5.1).

Finally, the two main cooperative unions - NCU (1984) and SHIRECU – remain the largest owners of ginning capacity, albeit with old equipment. Within the private sector, ginning capacity is actually slightly less concentrated than seed cotton purchases. The CR5 concentration ratio for private ginning capacity is 0.36, compared with 0.40 or slightly over for purchases (Table 5).

3.5. Lint Export

Cotton has long vied as one of the three most important export cash crops in Tanzania, the other two being coffee and cashew. (More recently, tobacco has also grown in importance). In the 2004/05 marketing season, following the record harvest in 2004, it was the largest export earner of all agricultural commodities in the country. The value of lint exports during the 2004/05 marketing season was US\$90.3 million and this rose to US\$116.1 million during the 2005/06 marketing season. The total value of so-called traditional (i.e. major agricultural) exports was US\$354.5 million in calendar year 2005, meaning that cotton contributed about 30% of the value of agricultural exports. However,

¹¹ As there have been no new cooperative ginneries built since 2002, the discrepancy between the 20 cooperative ginneries currently recorded and the 18 reported by Maro and Poulton, 2002 is a matter of data error in one or other source.

¹² Data gathered by TCB ginning inspectors during their visits to the 29 (private) ginneries that were in operation during the 2006/07 marketing season show a mean bale weight of 200kg. Ten out of the 29 ginneries still produce bales of the traditional 181kg weight. The maximum bale weight recorded was 275kg. However, ginnery ratings are calculated in bales and we understand that the traditional 181kg weight is still assumed for the purpose of these calculations.

¹³ The 41 private ginneries are owned by 29 companies.

gold exports (US\$641.7 million in 2005) greatly exceed agricultural exports. Exports of gold and other minerals helped raise total exports of goods and services to US\$1.676 billion in 2005. Thus lint exports were only around 6% of Tanzania's total exports of goods and services.

Export of lint is more concentrated than ginning, but there are still several players involved. We only have figures by company for export during the 2002-03 marketing season. During this season, fourteen companies exported lint from Tanzania, with the top five accounting for 66% of the country's lint exports¹⁴. Of the fourteen, nine operated their own ginneries. In general, although there are exceptions to this, exporters from Tanzania handle lint from a number of ginning companies.

Table 6 shows the destinations to which Tanzanian lint was exported in 2002-03 and the value of lint sent to each region. In conformity with global trends, the majority of lint (86%) went to Asia. However, within this there was a bias towards fewer quality-demanding buyers in South Asia, where cheap labour is available to sort out foreign matter before lint is spun. Smaller volumes of higher quality lint were sent to Europe (by Copcot and BioRe), Middle East and, in some cases, East Asia.

Table 6: Destinations of Tanzanian Lint Exports 2002-03 and Prices Received

Destination Region	Tons	Value (US\$)	Mean f.o.b. Price (US\$/ton)
S. Asia	20,116	17,065,194	848
S.E. Asia	10,983	9,387,475	855
E. Asia	8,316	7,618,645	916
Europe	2,469	3,103,926	1,257
Middle East	1,477	1,621,624	1,098
Africa	968	946,367	978
TOTAL	44,329	39,743,231	897

Source: TCB data

During the 2002-03 lint marketing season, the Cotlook A index price (based on lint c.i.f. North Europe) varied from US\$0.49/lb during August-October 2002 to US\$0.61/lb in March 2003. This makes comparison of the prices quoted in Table 6 with prevailing A index prices difficult. However, based on a US\$3/lb differential between c.i.f. and f.o.b., it appears that 80% or more of Tanzanian lint was exported at a discount to A index equivalent prices during 2002-03 and that a quarter or more was exported at a discount of more than 20%.

¹⁴ In 2002-03 marketing season, the five largest exporters were Roshan Meghjee & Co Ltd, Cotton Agency, SM Holdings, Livercot Impex and Olam (Tanzania) Ltd. Three of these are agents who export on behalf of ginners. SM Holdings is a ginner as well as an exporter. Olam buys from ginners and then exports the lint. Olam is building a long-term supply relationship with one Tanzanian ginner, although this does not (yet) appear to include much, if any, pre-finance.

3.6. Domestic Textile Industry

Historically, the textile industry in Tanzania evolved as a result of high demand for cloth, particularly “kikoi”, “khanga”, “kitenge” bed sheets, blankets and other dressing materials. The period between 1966 and 1985 saw rapid growth of the textile industry in Tanzania. This was a result of the government’s policy of industrialization aimed at producing consumer goods locally and adding value to primary products like cotton. Combined government and private sector investment in textiles amounted to US \$500 million. The public sector had 15 textile mills throughout the country complemented by seven privately owned mills. The total installed capacity was over 300 million linear meters. A very small percentage of this was of synthetic fibers, mainly polyester (TCB&SL, May, 2002).

At its peak in the late 1970s, the textile industry was the largest manufacturing sector in Tanzania in terms of employment and second largest by gross value of production. It employed about 25% of the manufacturing labour force and contributed about 25% of the GDP by the manufacturing sector.

According to Maro and Poulton, 2002, the textile industry suffered after 1994/95 as a result of a combination of unfavourable economic and policy factors, including: inadequate supply of cotton lint, as the previous policy of prioritising supply to domestic textile mills ended with cotton marketing liberalisation (the new private ginners of seed cotton preferred exports to local sales, which raised raw material prices for domestic textile companies); sharply increased competition from imports, especially second hand garments, as a result of the policy of trade liberalisation; lack of power and/or power interruptions; high power tariffs.

During the 1990s, domestic textile production consumed about 20% of lint produced. In 2004, World Bank / Government of Tanzania, 2004 estimated this figure to be 15%, but Tanzania Cotton Board, 2005 also cites 20% as the best estimate. There have been several investments in the textile industry in recent years - focused on the domestic market, as much as on opportunities opened up by AGOA¹⁵ – but a number of factories encountered (apparently unrelated) problems in 2005, which restricted their operation (Tanzania Cotton Board, 2005).

According to The Daily News of 04/10/2006, Mwanza Textile Mills (privatized in 2002 and currently “70% rehabilitated”) is now gearing up for exports to the US under AGOA provisions. Meanwhile, one of the ginning companies, Jambo Oil Mills Ltd, is currently constructing a spinning mill in Arusha, expected to start operation in mid-2007. There are

¹⁵ According to AGOA.info, US imports of duty-free 'textiles and apparel' items from Tanzania under AGOA rose from US\$851,000 in 2003 to US\$2.81 million in 2005. Thus, there has been growth after a slow start. Tanzania qualified for the 'Wearing Apparel' provisions of AGOA on February 4, 2002, and in terms of AGOA was also classified as a 'Lesser Developed Country'. This allowed Tanzania the use of non-qualifying third country textile inputs for the manufacture of AGOA-eligible garments, at least until September 30, 2004 (http://agoa.info/index.php?view=country_info&country=tz).

plans to sell yarn to the Far East and the US and then to integrate further forward into textile production for the domestic market.

3.7. Oil and Cake

As well as investing in ginnery expansion, many of Tanzania's cotton companies have recently been erecting oil mills. We understand that twelve or more cotton companies now have their own mills.

Early entrants into the oil business, who have had time to establish a brand reputation for their product, report that it can be a more profitable business than cotton ginning¹⁶. A related motive for investment in oil milling appears to have been the low prices that cotton seed fetched in the years of bumper cotton harvests in 2004 and 2005. Thus, in 2005 the cotton seed price fell as low as TShs 30/kg (US\$27 per ton). By contrast, in 2006, when cotton seed supplies were short, the price reached TShs 140/kg (US\$110 per ton). This volatility must also impact on the profitability of the oil business, as the final product has to compete with imported brands, but it appears that ginners are banking on increases in seed cotton production keeping cotton seed prices low in the coming few years.

The oils produced by cotton companies are semi-refined, which keeps the cost of production down¹⁷. In the WCGA market, they also enjoy the natural protection against their main Dar-based rivals (Oki, Kori) that is afforded by high transport costs. Furthermore, the best cotton seed oils are preferred by local consumers for frying fish (important on the shores of Lake Victoria) and cooking chapatis and local doughnuts, because they burn less easily/quickly than the main Dar-based brands, which are produced using imported palm oil.

By contrast, the only oil from the WCGA that currently competes in the Dar market is the long-established Voil, a company that buys from cotton ginners (and also other raw materials suppliers?), but is not involved in cotton production itself.

In early 2007 the ex-factory price of a 20 litre tin of cotton seed oil was around TShs 20,000, of which TShs 3-5,000 was accounted for by the cost of the tin.

Meanwhile, the cake market is less formalised, but can offer good returns. There are no feed millers in the WCGA, so there is limited competition for cotton seed cake (other than grass!) at the more commercialised end of the livestock business. In Shinyanga, commercial livestock activities centre on fattening up cattle produced by smallholders ready for sale to Dar es Salaam. Some Dar-based chicken feed millers also come to Shinyanga to buy cotton seed cake. Large cake customers (interested in buying anything

¹⁶ A good example of an early entrant is Birchand Oil Mills. They established their oil mill in 1994 and integrated backwards into ginning in 1996/97 due to a shortage of seed for crushing. Their "Ndiyo" brand oil is well known throughout the WCGA.

¹⁷ One miller whom we visited told us that the cost of producing a fully refined product was almost double that of producing the semi-refined product.

from 2-100 tons) tend to purchase at the mill. Some millers, such as Jambo, also run retail shops in the city centre at which they sell both oil and cake.

Cotton companies are heavily reliant on independent trucking companies for the transportation of their cotton, both from buying posts to ginneries and from their ginneries to Dar es Salaam port (when they sell f.o.b.).

3.8. Transport Services

There is a railway connection from Dar to Mwanza that passes through Shinyanga, but this has experienced operational difficulties for some time. (A planned privatisation of the railways in Tanzania is a hot political topic!). At the same time, parts of the road connecting Shinyanga to Dar are very poor, although much of the Shinyanga-Mwanza stretch is new. As a result of these domestic transport difficulties, it costs more to transport a bale of lint from WCGA to Dar than it does to ship it from Dar to a port in Asia.

4 CURRENT INSTITUTIONAL ARRANGEMENTS AND PERFORMANCE

4.1. Regulation of the Tanzanian Cotton Sector

Since the passage of the Cotton Industry Act in 2001, responsibility for regulation of the Tanzanian cotton sector has officially lain with TCB. On paper the act gives TCB sweeping powers and some commentators (e.g. Cooksey, 2003) feared that this marked a retreat from the government's previous commitment to sector liberalisation. However, amongst sector stakeholders there is a fair degree of consensus around the need for a strong organisation that can provide coordination and strategic leadership, given the problems of achieving effective coordination amongst 30 or so highly competitive ginning companies¹⁸.

TCB's predecessor organisation, TCL&SB, had had limited powers and even more limited resources. One of the drivers behind the 2001 act was the perception amongst policy makers - brought into clear focus during the sector stakeholders' meetings initiated in 1999 - that there was a need for an organisation that could play a more active developmental, as well as regulatory, role within the sector.

In 2003-04 the role of TCB was re-examined as part of the World Bank / Government of Tanzania / European Union-funded review of crop boards in Tanzania. During this review it was clear that leading ginners favoured an active role for TCB - even in areas,

¹⁸ Of course, there are also dissenting voices, some of which we heard during the fieldwork for this report. More common are grumbles about specific decisions and actions taken by TCB or the linked organization, CDF. However, one may disagree (quite often with some justification) with individual decisions without departing from the wider consensus.

such as input provision, that are traditionally defined as private goods. From a ginner's perspective, if state involvement helps to strengthen the provision of pre-harvest services to producers and to provide incentives to all players for the pursuit of high quality lint, this frees the ginner to concentrate on competing in seed cotton purchase, ginning and possibly export.

Of course, given past experience with state intervention in the cotton sector (and other areas of economic life in Tanzania), there are legitimate concerns that any state agency needs to be made accountable to private stakeholders within the sector for the performance of its functions. The consensus that has emerged amongst TCB and leading ginneries in favour of an active role for TCB has emerged in part because the process of multi-stakeholder consultations that was initiated in 1999 has led to a gradual increase in trust between the two parties. Below we observe that, even though some of the interventions pursued since 1999 have been well-intentioned, they have not always been effective, efficient or equitable. However, there has been a readiness to learn from experience and to refine or re-design interventions, which gives hope for the future.

The structure and financing of TCB is explored in some depth by World Bank / Government of Tanzania, 2004. It has a modest complement of managerial and administrative staff based in Dar es Salaam and Mwanza, plus eleven or so cotton classifiers, six ginneries inspectors and eleven cotton inspectors (extension staff) working at district level. The latter work with Ministry of Agriculture extension staff in the districts where they are based. In the districts with no cotton inspectors – cotton is grown in 29 districts across WCGA – cotton extension work is undertaken by Ministry of Agriculture staff as one of their duties.

TCB issues licences to ginneries and exporters, keeps statistics, classifies lint prior to export, inspects ginneries and has for some years also hired private monitoring companies to oversee quality control at ginneries. It is responsible for (cotton) seed multiplication in the country. Through its cotton inspectors and collaboration with the Ministry of Agriculture, it attempts to promote cotton production. It also advises the Minister of Agriculture on sectoral policy and, through its key role in CDF, is intimately involved in decisions about input supply and research for the cotton sector.

TCB is led by a Director, who is appointed by the Minister of Agriculture, and has its own board, also appointed by the Minister. According to World Bank / Government of Tanzania, 2004, the 2001 act states that this board should have five members: a Chairman (who is usually an MP from somewhere within WCGA), a member from Tanzania Cotton Association (i.e. a ginner), someone representing growers (who, in the absence of a credible producers' association until recently, may also be an MP), and representatives of the Ministries of Agriculture and Local Government.

MPs from the main producing areas also get an opportunity to express their views on the performance of TCB (and of the sector more widely) at the annual sector stakeholders' meetings. The influence of MPs within the sector is a source of concern to some observers, who equate it with political interference or fear rent-seeking motivations.

However, a more benign explanation is that the active engagement of MPs representing a significant proportion of the country's population¹⁹ ensures that due attention is given to promoting the sector's development and that, where sector performance is adversely affected by factors outside the control of TCB management, there are influential voices able to speak up for the sector within both Parliament and the ruling party.

Until 2006, much of the cost of running TCB was met through a levy on marketed seed cotton. (Its other main revenue stream was rent on property it owned). However, the combined burden of a number of taxes and levies on seed cotton sales was widely seen as exerting undue downward pressure on the price received by producers (section 4.7). Therefore, in April 2006, as part of a memorandum of understanding between the government, TCA and TACOGA (the fledgling farmers' organisation), the government agreed to fund the core costs of running TCB directly out of the national budget. This was a move that World Bank / Government of Tanzania, 2004 had argued in favour of.

There are, however, two significant disadvantages to this course of action:

1. The first is a practical one. We understand that TCB has not found it easy to obtain all the funds that it was allocated in the budget. Moreover, they have had to cut back on certain activities (e.g. monitoring of ginneries) as a result. By contrast, levy funding gave TCB considerable control over its funding stream, even if the value of levy payments depended critically on the size of the year's harvest;
2. The second is a more theoretical point, but potentially important nonetheless. If farmers and ginners see their own money going to TCB, they are more likely to follow closely how it is used than if the money comes from an impersonal source (e.g. the national budget).

The TCB levy amounted to perhaps 2.5% of the seed cotton price (see section 4.7). From a farmer's perspective, this is not a negligible sum. However, if levy payments entitled farmers to a stronger voice in how TCB was run, this might be a price worth paying.

There are ways of correcting for both the disadvantages noted above without returning to levy funding. The April 2006 memorandum of understanding notes that the government contribution to TCB will fall within the MTEF framework (that sets out the forthcoming budget for the Ministry of Agriculture, amongst other things). This should, at least, provide some predictability to TCB budgeting. However, the onus is still on TCB, plus the MPs of WCGA and others interested in the success of the cotton sector, to make the case for increased funding for TCB within the projected Ministry budget and also to put pressure on the Ministry to release the budgeted funds in good time. On the second point, other mechanisms can be established or strengthened to enhance the accountability of TCB to its stakeholders. These include modifications to the composition of TCB's own board. If these measures prove unsuccessful, however, then one should perhaps consider

¹⁹ Mwanza and much of Shinyanga regions are home to the Wasukuma, the largest ethnic group within Tanzania.

reinstating the TCB levy, and perhaps having payment go to TCB through CDF (or its replacement) to strengthen the accountability mechanisms.

This brings us to consideration of the Cotton Development Fund (CDF), which was established in 1997 and, like TCB prior to April 2006, is funded through a levy on all seed cotton purchased (TShs 20/kg in 2006). CDF is currently managed by a board which comprises TCB, two ginners' representatives, representatives of two Ministries and (as recent additions) two representatives from TACOGA. TCB provides the secretariat to CDF²⁰.

CDF has two main functions. The majority of the CDF levy is spent on input procurement and distribution to producers (discussed in section 4.4). It has also funded ongoing research on cotton at the country's two cotton research stations, Ukiriguru in WCGA and Ilonga in ECGA. However, as part of the April 2006 memorandum of understanding, the government also undertook to provide the majority of research funding through the Ministry of Agriculture budget.

Finally, we note that, whilst progress has been made over a number of years in building working relationships and trust between TCB and leading ginners, until very recently producers have not had direct voice in the policy making process for cotton in Tanzania²¹. This shortcoming was recognised during the World Bank / Government of Tanzania / European Union-funded review of crop boards in Tanzania in 2003-04. Since this time, some progress has been made in establishing a producers' organisation, the Tanzanian Cotton Growers' Association (TACOGA). TACOGA was registered by personal initiative of an ex-cooperative employee in October 2002, but funding to create a strong, grassroots organisation has been lacking. TCB has provided some financial assistance to enable founder members of the organisation to meet and the benefits of membership are being promoted by "lead" farmers who have won awards in annual competitions organised by TCB. In January 2007, Mr.Nduta, the driving force behind TACOGA, estimated that around 5,000 members had been signed up. He and another leading figure in the organisation have been allowed to participate in CDF board meetings, but feel that they will be able to speak with greater legitimacy once a first annual general meeting, with elections to leadership posts, has been held. It is hoped that this will take place in April 2007.

One can argue that, given the competitive nature of the Tanzanian cotton sector, the consequences for producers from a lack of a strong representative organisation are not as

²⁰ As part of the April 2006 memorandum of understanding, it was agreed that CDF should be reconstituted as a trust fund. The workshop that preceded the signing of the MoU proposed that the Board of Trustees of this fund should comprise three representatives from TCA, two representatives from TACOGA and two government members.

²¹ MPs might argue that their presence at annual stakeholder meetings guarantees that the interests of producers (their constituents) are taken into account in the formulation and implementation of sector policy. Indeed, some MPs in cotton zones are themselves large producers of cotton. However, it is also possible that their interests as large and well-connected producers actually diverge from those of the majority of their (much poorer) constituents in some areas.

serious as they could be under a more concentrated market structure. Nevertheless, the formation of a representative producers' organisation that can speak for producers in policy dialogues - and ultimately perhaps also provide producers with services related to cotton production and marketing - is a desirable objective and one that TCB/CDF will do well to continue to support.

4.2. Public Investment in the Cotton Sector

Prior to liberalisation, public investment in the cotton sector occurred through subsidies or debt write-offs paid to loss-making cooperatives, plus funding of the two cotton research stations. Public loan guarantees to cooperatives engaged in cotton buying and ginning continued for around a decade after liberalisation, but declined significantly after 2000. Moreover, since 1994 it is unclear whether one can count this as investment in the cotton sector or support to one type of supposedly private organisation operating within it.

Aside from this funding, which has yielded no lasting return, for most of the period since liberalisation there has been no funding of the cotton sector from either national or local government budgets, other than paying the salaries of cotton researchers and other staff at the two cotton research institutes. Indeed, conversely, in major cotton growing areas, the cotton sector has been a major contributor to local government funds through the district levy paid on seed cotton sales and other associated levies, e.g. for education (see section 4.7).

Since the April 2006 memorandum of understanding between the government, TCA and TACOGA, the government has committed to fund the basic operating costs of TCB and to fund the operational costs of cotton research within the country through the Ministry of Agriculture budget. However, as already noted, reliance on such central government funding is not without its difficulties.

4.3. Research and Extension

Research for the cotton sector is undertaken at two government research centres, Ukiriguru in WCGA and Ilonga in ECGA. In the period between the establishment of CDF and the signing of the memorandum of understanding in April 2006, the operational costs of work at these centres were funded out of the CDF levy. (Staff costs were paid by government). The budget for research allocated by CDF was decided on an annual basis. We understand it to have been around TShs 250 million p.a. in recent years, of which 70% went to Ukiriguru and 30% to Ilonga.

According to Maro and Poulton, 2004, citing TCB figures, in 2002/03 there were ten²² researchers working on cotton at the two research stations and the associated budget was US\$179,000. World Bank / Government of Tanzania, 2004 (p70) commented that, "In

²² This number is nine in 2007: seven at Ukiriguru and two at Ilonga.

cotton and cashew research stations, government covers staff salaries. The industry funds are not adequate to meet research costs.”

For 2006-07, the Ukiriguru agricultural research institute is expecting to receive TShs 150 million (US\$115,000) from the Ministry of Agriculture for operational costs, in addition to payment of salaries. Thus, it appears that its funding is going to decline as a result of the change in funding source.

Ukiriguru is considered a moderately well performing organisation by the standards of Tanzanian agricultural research institutes. Its output is modest, but there are debates as to whether this principally reflects lack of funding or lack of incentives for staff and effective accountability to sector stakeholders.

In the 2005/06 production season, a “new” seed variety, UK91, was finally distributed to cotton producers in WCGA. Producers are happy with it (see section 4.4); it is more uniform than the mixed seed stock that it replaced, and it has a slightly higher ginning out-turn. Research trials indicate that UK91 should give a lint out-turn of 0.38. TCB ginning inspectors visited 29 private ginneries two or three times each during the 2006/07 marketing season. Their lint out-turn tests showed that, in practice, ginneries using double roller gins were obtaining a mean out-turn of 35.9% (maximum = 38.5%) from UK91, whilst ginneries using saw gins were obtaining a mean of 34.3% (maximum = 35.5%). These figures compare with 33-34% obtained from the previous seed.

However, UK91’s name reveals when it was actually released: 1991. No new varieties have been released since then, although trials are being undertaken with farmers on four new lines, out of which the replacement to UK91 will hopefully emerge. It is claimed that these new lines have a considerably higher ginning out-turn (41-42%) than UK91, with better resistance to some pests, whilst maintaining the same yield potential.

Over the past decade, staff at Ukiriguru have worked on a number of issues, including the promotion of scouting (through STABEX funding) and the trialling of labour-saving technologies (ox-drawn planters and weeders). However, the impression is that these efforts have faded out whenever the particular time-bound funding source was exhausted.

Clearly, greater research output is required if the Tanzania sector is to keep up with the rate of productivity growth in the global cotton industry. Increased funding will clearly be required if this is to be achieved. However, this should be accompanied by institutional arrangements that ensure the accountability of cotton researchers to sector stakeholders. Reorganisations of research in the coffee and tea sectors are held up as examples of what can be done here. Whilst different models have been devised in the two sectors, both involve increased funding and increased private sector participation in management and/or decision making.

At this point it has to be noted that the problem is not simply one of researchers being reluctant to make themselves more accountable to industry stakeholders. In the cotton sector, there is little evidence of effective demand from ginneries for greater research

output. In turn, this may well be related to the structure of the sector. It is more difficult to get 30 ginners to speak with one voice on any issue than it is to get two duopolists to agree on a common line and, when long-term effort is required to work with researchers to enhance the quantity and quality of their output, the temptation to free-ride must be high. In 2006, TCA set up a Crop Development Committee to consider all matters related to production enhancement (presumably, therefore, including research). However, as of early 2007 the committee had not held its first meeting.

Finally, with regard to extension, we note that the incentives for individual companies to provide extension advice and training to farmers are weak when numerous companies may arrive at harvest time to compete for the resulting seed cotton. Nevertheless, a few companies (e.g. Copcot in Geita) have invested in training (e.g. appropriate pesticide application) for farmers in their areas. Beyond this, the main burden of responsibility for extension rests with the cotton inspectors where they exist and with the regular Ministry of Agriculture extension staff where they do not. A fairly easy conclusion to reach is that TCB has neither the financial resources nor the managerial manpower to provide adequate extension support to the large number of cotton producers that are scattered over a large area of Tanzania. Arguably, this is one reason (though probably not the most important one) why cotton yields in the country remain low.

4.4. Seed Production and Supply

Distribution of cotton seed to Tanzanian farmers has been handled by the state since colonial times. For most of this time, seed has been provided free or on a heavily subsidised basis. Except when new varieties are being rolled out, the seed that is distributed to producers is seed retained from the previous season's ginning activities. In these "normal" years, all ginners in Tanzania are required to retain 5% of the seeds from their ginning process. The chosen 5% must come from Fusarium wilt-free production zones. These seeds are dusted and packed, then distributed to producers through various local channels (much as passbooks are)²³. In the past five years there have been experiments with mechanical delinting of this seed. However, no fully satisfactory method of delinting has yet been agreed. At present, TCB is considering applications from private companies to undertake seed delinting for the sector. In the meantime, the Tanzanian cotton sector still uses fuzzy seed.

Prior to liberalisation, two main zones were demarcated within the WCGA, each of which had its own seed variety (known as UK77 and UK82 respectively) that was particularly suited to agro-ecological conditions within the zone. To keep the two varieties separate, ginneries were only allowed to gin seed cotton that had been produced within their zone. Immediately after liberalisation, this zoning broke down and the two varieties became mixed. This is reported to have had negative impacts on both productivity and lint quality (Gibbon, 1999).

²³ Amongst respondents to the 2004 household survey, 75 claimed to have obtained their seed from a cotton company, 73 from their village government, 35 from a stockist, 31 from a primary society and 15 from other farmers. Nevertheless, seed was generally found to have arrived in good time for planting.

Attempts were made by TCB to introduce a new seed variety, UK91, which had been shown in trials to perform as well as UK77 and UK82 across the entire WCGA. However, without zoning it proved impossible to prevent UK91 from being mixed with the existing seed stock during initial multiplication and the first attempt to introduce it was abandoned. Amid allegations that no pure UK91 seed at all remained after this, researchers had to seek individual plants that were considered genetically pure as a basis for rebuilding the breeding stock.

Introducing UK91 gained a new importance through the annual stakeholders' workshops. In addition, Baffes, 2002 identified the successful introduction of UK91 as the single highest priority for TCB action. Subsequently, TCB engaged leading ginners to assist it in multiplying the renewed UK91. Learning lessons from the 1990s failed attempt to scale-up production, temporary restrictions were imposed on seed cotton buying and ginning in Mara district to ensure that no mixing took place. In the bumper harvest of 2003/04, enough seed was multiplied to supply the entire WCGA. However, there was insufficient time to gin and delint all this seed before distribution for the 2004/05 season began. Therefore, around half of WCGA (Mara, part of Shinyanga, Kigoma and Singida) was planted to UK91 in 2004/05, with zoning again enforced at marketing time to ensure that this seed was not mixed with the remaining old seeds²⁴.

With both frankness and some sense of eventual success, Tanzania Cotton Board, 2005 reported that:

Finally, during 2005/06 season, the operation to clean up the mess created in the aftermath of the market reforms, whereby previously zoned seed varieties got mixed in the ensuing competitive scramble for seed cotton, was successfully completed. Multiplication of pure seed from UK91 and ALAI90 varieties for WCGA and ECGA respectively was completed successfully. As a result, during the 2005/06 planting season, smallholders will for the first time in many years plant clean seed and better quality seeds derived from just two pure varieties, namely UK91 and ALAI90.

During focus group discussions in two villages in each of Kwimba and Bariadi districts in January 2007, respondents expressed their satisfaction with the performance of UK91 in both 2005/06 and so far during 2006/07. The 2005/06 season was affected by drought and, although national production was only around a third of the level achieved in the record 2004/05 season, participants remarked that UK91 withstood the drought better than the previous seeds would have done. They also commented on its excellent germination in both seasons and on its large white bolls. Their main concern was that, having done well in a drought year, UK91 might not do too well in a very wet year, which (as of January 2007) the 2006/07 season could still turn out to be.

Meanwhile, starting in 2003/04, producers have been charged TShs 100 per kg of seed. In 2003/04 this represented a steep increase from the nominal TShs 15 per kg charged in

²⁴ This zoning requirement is, incidentally, a good example of the need for TCB to play a strong regulatory role in the highly competitive Tanzanian sector.

2002/03, but still only a fraction of the cost of delinted seed in Zimbabwe or Zambia²⁵. TShs 100 per kg was, however, sufficient to cover the opportunity cost of the seed (the selling price to oil mills was around TShs 60 per kg in 2004) plus delinting, packaging and distribution to producers [P.Kapoor, *pers.comm.*]. Moreover, getting producers to pay more realistic prices for seed is a desirable first step if private capital is eventually to be brought in to develop cotton seed production in Tanzania²⁶.

With the introduction of the passbook system (see section 4.5), producers have been able to purchase seed using their passbook entitlements. In addition to the convenience factor, this is a useful way to use small entitlements (or parts of entitlements) that are insufficient to purchase a bottle of chemicals. Amongst respondents to the 2004 household survey, 58 claimed to have used their passbook to purchase seed in 2004, whilst 169 paid for their seed on a cash basis²⁷.

However, starting in 2007/08 TCB is considering taking seeds out of the passbook system. The reason for this is that the administration of the passbook system is too complex (and/or available human resources insufficient) to process all the passbooks in time to allow timely purchase of seed through the passbook. This is considered further in the next section. For now, we note in our survey data about 10% of the poorest producers do not obtain a sufficiently high entitlement in their passbook to permit the purchase of even one bottle of chemicals through the passbook system (Table 8 below). This means that, if cheaper and more “divisible” seeds were not available through the passbook system, they would either have to supplement their passbook entitlement with cash in order to obtain one bottle of chemicals or would risk losing what small entitlement they did have. However, we also note that, in 2006/07, for the first time TCB allowed producers to carry over any unused entitlement in their passbook from the previous year. If this practice is continued, which is certainly desirable, then any “unjust” consequences for the poorest producers of the removal of seeds from the passbook system will be reduced.

4.5. Fertiliser and chemical usage and provision

As earlier discussion of low yields in the Tanzanian sector suggested, seed cotton production in Tanzania is quite extensive. A negligible proportion of producers (1-2%) uses any inorganic fertiliser in cotton production²⁸. However, the 2004 household survey

²⁵ Some seeds in Zimbabwe and Zambia are also treated with the Cruiser chemical, which adds significantly to both cost and performance. Therefore, whilst treated, delinted seed costs US\$0.5-0.6 / kg in Zimbabwe and Zambia, compared with around US\$0.1 / kg in Tanzania, the products are not entirely comparable.

²⁶ In recent years, discussions have been held between TCB and Quton, the seed company owned by Cottco and responsible for seed production in Zimbabwe, about the possibility of Quton establishing an operation to produce certified seed in Tanzania. However, no firm plans have resulted from these discussions.

²⁷ Note that this shows that seeds are available for cash purchase by those who want to buy them. This was also confirmed by our focus group discussions in January 2007

²⁸ Starting in the 2005/06 production season, the Tanzanian government provided subsidies on about half the quantity of fertilizer consumed in the country. Around 70% of subsidy funds have been directed to DAP

did indicate that 25% of producers in Bariadi and 42% of producers in Kwimba applied manure to their cotton fields in 2003-04. In both cases this was a considerable increase over the percentage recorded in 2002. The survey did not ask for the reasons behind trends in manure use, but we suggest that increasing manure was driven by two different (but possibly complementary) factors: growing concerns over soil fertility on the one hand and optimism that investment in cotton production in the 2003-04 season was going to be worthwhile on the other.

From our focus group discussions in January 2007, it appeared that manure use was more widespread in the two villages in Kwimba than in the Bariadi villages. (This is consistent with the 2002 and 2004 household survey findings across the two districts). In the Kwimba villages, it was the top cotton producers – who also had more livestock and/or could afford to buy manure – who were most likely to use it. In both Bariadi villages, respondents reported that yields (of maize as well as cotton) had been falling over time on at least some plots. In one of these villages, this had prompted the local administration to begin promoting manure use quite recently. They had promoted it principally on maize and those who had tried applying it had seen encouraging results. In the second Bariadi village, respondents distinguished between high fertility plots, where yields were still being sustained, from low fertility plots, where yields had been observed to fall. Their response was to concentrate their priority crops (maize and cotton) on the high fertility plots, rather than to add external nutrients. However, this strategy can only succeed for a finite period.

Apart from seed and hired labour, the most commonly purchased input in cotton production in Tanzania is crop protection chemicals. Even these, however, are far from universally applied and, where they are applied, it is in modest quantities. Table 7 shows the proportion of farmers in Kwimba and Bariadi districts who applied crop protection chemicals in 2002 and 2004, along with the average number of sprays applied by those who did use chemicals.

Table 7: Proportion of Farmers Spraying Chemicals.

	Kwimba		Bariadi	
	2004	2002	2004	2002
Proportion of Farmers Spraying (%)	54.9	27.6	77.1	71.3
Average Number of Sprays	2.4	1.5	3.6	2.7

Source: household surveys 2002, 2004

Prior to liberalisation, distribution of pesticides to producers was the responsibility of regional cooperative unions and their associated primary societies. The majority of pesticides were supplied on credit. After liberalisation, enforcing repayment of input credit became much more difficult, contributing to the mounting debts of the cooperative unions. Larsen, 2003 records that distribution of pesticides dropped from 335,631 litres in 1992/93 to just 93,810 litres in 1997/98, during which season cooperatives supplied

and urea destined for maize, the remainder to TSP, CAN and NPK, which are commonly used on tobacco. Although we heard mention of these fertilizers in Bariadi district, we did not hear of any of them making their way onto cotton plots.

pesticides on cash terms only for the first time. A small number of private ginning companies also experimented with chemical supply on credit, but quickly abandoned this when they realised the impossibility of enforcing credit contracts in such a competitive output market.

In response to the declining availability of pesticides, the newly-formed Cotton Development Fund (CDF) was given the task of ordering and distributing pesticides to producers. In the 1999/2000 production season, around 100,000 litres of pesticides were distributed to producers through village leaderships at subsidised prices. In 2000/01 this rose to 320,000 litres. With TCB under political pressure to be doing something about lack of input access, for the 2001/02 production season, a total of 1 million litres (or equivalent²⁹) of pesticides were ordered by CDF, through tenders with three private firms. So as to maximise the quantity that could be procured, a decision was taken to order primarily water-based pesticides (Decis 2.5, Karate 5), whereas farmers had previously been used to oil-based products. Only in districts that were judged to suffer severe water constraints (e.g. Magu and Bariadi) were oil-based products (Fenom C170, Bulldog 170) made available as before. Shao, 2002 (p.22) provides a comprehensive list of reasons as to why farmers were reluctant to invest in the water-based pesticides during 2001/02. In addition to the fact that they were unknown / unproven, they required a different type of pump to the oil-based products. Whilst many producers already had their own pumps for the oil-based products, the new pumps (supplied one per village with the water-based pesticides) were more difficult to get access to. As a result, the majority of the chemicals were not taken up by producers. The unfamiliarity with the water-based pesticides is one of the reasons why use of chemicals was so much lower in Kwimba than in Bariadi in 2002 (and even still in 2004, by which time additional sprayers had been made available and sceptical farmers had had a chance to see the new pesticides in action on their neighbours' plots).

The rush to switch to water-based pesticides is one example of questionable decision making within CDF, even though the basic goal of moving towards cheaper pesticides is a sensible one. Moreover, the basic design of the initial CDF system for chemical distribution (a revolving fund) could be criticised on both equity and accountability grounds. Maro and Poulton, 2005a noted that:

The theory was that farmers would pay levies for a fixed period, say 5 years, during which time a revolving fund was built up, such that inputs could then be acquired and distributed without further levies. However, even in this "ideal" scenario, farmers who bought inputs had to "pay twice" for chemicals whilst the levies were in place and would still pay the full price each year even once the levies had finished.

²⁹ There are difficulties in "adding up" quantities of oil-based and water-based pesticide. Whereas a one-litre bottle of oil-based pesticide might be sufficient to spray one acre once, a smaller bottle of water-based pesticide might be adequate to spray two acres of cotton. The total number of bottles / litres supplied to the WCGA in the 2001/02 production season was intended to be enough for one application on one million acres of seed cotton.

Those who didn't acquire inputs (including many of the poorer farmers) still paid the levies, even though they reaped no benefit from the system.

If the chemical price was subsidized³⁰, it would take longer to accumulate a revolving fund of a given size, as funds that would contribute to the expansion of the revolving fund were now spent on subsidies instead. Moreover, with subsidies in place it is impossible to maintain the value of the revolving fund without continuing to charge levies. This is because the subsidy element is not recouped from the purchasers of chemicals; hence it is a loss to the value of the fund in the following season.

In theory, it should be possible to set up a system whereby the use of the revolving fund is publicly accounted for; therefore "leakages" would be discouraged. However, this did not happen in either Lindi or Mtwara Regions when the Input Trust Funds for cashew (similar in design to the initial CDF system) were in operation (Poulton, 1998). As a result, large quantities of funds that were collected as levies during cashew marketing never made it to be used for sulphur importation.

Passbook System

During the 2002/03 season, therefore, a passbook system was piloted in Geita and Bukombe districts as an alternative way of assisting producers to access chemicals and seeds. The new system was considered a success (including by farmers), so in 2003/04 it was scaled up to replace the previous system for input access throughout the country's cotton producing zones.

The principles of the passbook system are as follows: As under the previous system, a levy is charged on all seed cotton sold. It is the responsibility of buyers to pay this levy to CDF, but inevitably, the value of the levy (so far set at TShs 15 per kg) is reflected in the price that farmer receive for their seed cotton.

The levies collected by CDF are used to fund the importation of chemicals. As under the previous system, a tender is issued and private companies receive contracts for the actual importation.

However, unlike under the previous system, when farmers sell their seed cotton they receive a stamp from the buyer in an official passbook (distributed throughout production areas prior to the start of the marketing season) to record the quantity of seed cotton sold. At the start of the following season, they are then entitled to claim, from the designated local source, inputs (seed or chemicals) up to the value recorded in their passbook. The system thus represents a form of "forced saving", albeit one that producers might welcome, rather than resent.

The passbook system is (in theory) more equitable than the previous system, because all producers who market seed cotton in one season are automatically entitled to receive a

³⁰ CDF claim that chemicals were distributed at cost price and that the low price that they were able to charge reflected the benefits of bulk purchase, plus the selection of cheap chemicals.

quantity of inputs (proportional to the value of seed cotton marketed) during the following season. It also has a built-in accountability mechanism, because, if some of the money that is collected is siphoned off by those in charge of the fund, this should become evident the following season when some farmers are unable to claim the inputs that they are entitled to. Finally, Maro and Poulton, 2005a also observe that, whilst it provides for a minimal level of chemical use within the cotton sector (something that was lacking amongst 50% of producers in the 2002 household survey) the passbook system still leaves plenty of room for the development of private sector input supply. This is because producers who wish to apply three or four sprays of chemicals (i.e. the better-off producers, who are the most obvious clients for private stockists) are unable to satisfy this demand through their passbook entitlement. Thus, having been encouraged to grow cotton by the security of their passbook entitlement, they are likely to turn to stockists for their supplementary input requirements.

Table 7 showed that input use had increased in our two survey districts between 2001/02 and 2003/04, at least in part because of the introduction of the passbook. Table 8 examines our 2004 household survey data to see the distribution of passbook entitlements across 238 cotton producing households in the 2002/03 and 2003/04 production seasons. This is based on production data alone, i.e. it assumes that all producers receive their full entitlement of TShs 15 worth of inputs per kg of seed cotton marketed, an assumption that we explore below. We also focus on entitlements to chemicals, given that seeds may be taken out of the system next season.

Table 8: Distribution of Passbook Entitlements across Cotton Producing Households

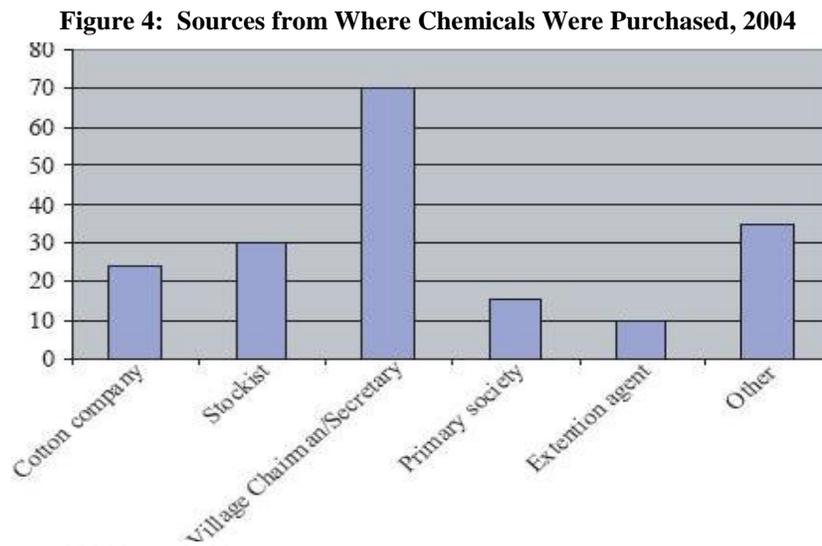
Production of Farmer	Implication for Passbook Entitlement	Number of Respondents	
		2002/03 Production Season	2003/04 Production Season
Did not produce during previous season	No passbook entitlement	62 (26%)	36 (15%)
Produced in previous season, but not this season	Might not claim passbook entitlement	31 (13%)	2 (1%)
Production in previous season <200kg	Passbook entitlement insufficient for one "acre pack"	19 (8%)	23 (10%)
Production in previous season >200kg, but yield <200kg/acre	Passbook entitlement insufficient for one spray on same area	27 (11%)	39 (16%)
Yield in previous season between 200kg/acre and 400kg/acre	Passbook entitlement sufficient for one spray on same area, but insufficient for two sprays	31 (13%)	57 (24%)
Yield in previous season between >400kg/acre	Passbook entitlement sufficient for at least two sprays on same area	32 (13%)	35 (15%)
Missing data on previous season's production	-	33 (14%)	46 (19%)
		238	238

Source: 2004 Household Survey

Table 8 shows that, in the two seasons considered, 15-26% of cotton producing households had not grown cotton the year before, so had no passbook entitlement. This will also have been true to some extent in 2006/07, given the 2005/06 drought. Our experience suggests that it is predominantly poorer households who switch in and out of

cotton production, although a few larger, more commercialised farmers might do so as well. A further 10% (again, mainly poorer households) had an entitlement, but one that was insufficient to purchase a single bottle of chemicals. A further 11-15% were entitled to one or more bottles of chemicals, but not sufficient to spray the same acreage as they cultivated the previous season with one spray using the recommended dosage. Only a minority (26-39%) were able to obtain one or more sprays for their full production area through the passbook system.

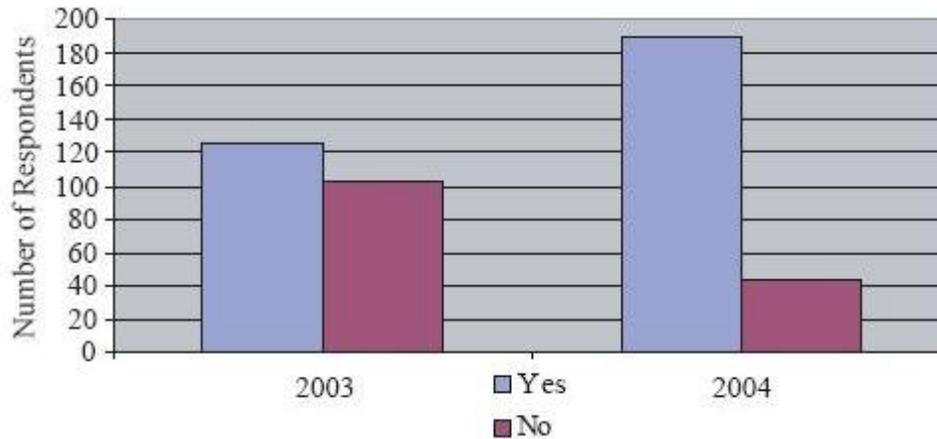
Of course, even good design in theory does not guarantee effective implementation and there have indeed been difficulties with the scaling up of the passbook system since 2003-04. Neither TCB nor CDF have presence at village level, so they have to rely on an ad hoc collection of willing and trusted village intermediaries (village Chairman or Secretary, primary society or extension agent, cotton company agent – Figure 4) for the distribution of both passbooks and subsequent input entitlements. World Bank / Government of Tanzania, 2004 (p64) reported that, following the 2003 harvest, “nearly 77 percent of the producers in all the districts had received passbooks. And nearly 88 percent of them had all the sales that they made entered in the passbook.” However, at the time of their survey in December 2003 – January 2004, “Only 31 percent indicated having received any inputs, most of them only seeds. Nearly three-quarters of the respondents indicated that they could not get the inputs they needed in a timely manner.”



Source: 2004 household survey

Based on the 2004 household survey, Maro and Poulton, 2005b reported that only 25% of producers using chemicals obtained them through their passbook, as compared to 73% who paid cash. However, figures for the distribution of passbooks for 2004-05 suggested that some of the irregularities of the first full season were being ironed out for the second season (Figure 5). Meanwhile, 74% of cotton producers responded that they wished the passbook system to be continued and showed fairly high levels of understanding of its implications (including for seed cotton prices).

Figure 5: Did you Receive a Passbook When You Sold Your Seed Cotton?



Source: Maro and Poulton, 2005b

The feedback from the focus group discussions in January 2007 was that further progress had been made in making the passbook system operational since 2004, but that challenges still remained. Thus:

- Some producers still did not receive passbooks even in 2006 (for the 2006/07 season). It is the responsibility of the local leadership in each village to prepare a list of cotton producers who will require passbooks and these lists are not always exhaustive. The problem is said to be getting less acute as the years go by, but this problem should have been fully resolved by now. We heard complaints that farmers whose names had been missed off the lists had indicated their need for a passbook, but that their village leadership had not been responsive once the requested number of passbooks had been delivered to the village and they had not been able to alert anyone else higher up in the system that their names had been overlooked.
- All producers with passbooks who sold seed cotton did receive stamps in their passbooks as they were supposed to.
- Producers with large entitlements had not always been given their full entitlement. Again, this problem was worse in 2005 than it was in 2006.
- Sometimes a range of chemicals was delivered to a village for distribution to those with passbook entitlements. However, producers in the village were not given any choice over which they received. In Bariadi, where preferences remain strong for oil-based, as opposed to water-based pesticides, this was a particularly sore point, as some received one and some the other.
- Pesticides arrived far too late in 2006 – in either April or May, depending on the village. (However, we were assured that, as of January 2007, they were already ready for distribution to villages).

Regarding the third point concerning large entitlements, there is a second side to the story: officials involved in the implementation of the passbook system report that some farmers had begun to collude with buyers' representatives (who often come from the village where they operate a buying post) to receive inflated entitlements to inputs in their passbooks. When this came to light, village committees were formed to scrutinise

entitlement claims before the input demands were communicated to CDF. However, even this did not solve the problem. Therefore, in 2006 all passbooks were collected in and sent to district level (cotton inspector, extension agent or district agricultural officer) for checking before the final input requirements for that district were collated. Where an individual entitlement seemed implausibly large, the village was visited and enquiries made with other villagers, with the result that some “cheats” were denied access to passbook inputs for 2006/07. In Kwimba district, for example, 10,500 passbooks were used during seed cotton marketing in 2006 and, of these, 375 were rejected for forgery³¹. It is the introduction of this checking procedure that has made it difficult to retain seeds within the passbook scheme, as passbooks may still be being checked when seeds need to be distributed.

The forgery problem illustrates the challenge of administering the passbook system over a wide area with no dedicated field staff. Similarly, the feasibility of any recommendation for improving its performance has to be examined quite carefully. However, the following suggestions are worthy of further consideration:

- It should be made clear to producers whom they should contact if they feel that their rights and entitlements have not been respected in the implementation of the passbook system. This might be an area where TACOGA can begin to demonstrate its worth to prospective members.
- When chemicals are distributed to a village, more should be sent than will be claimed through passbook entitlements. Producers should then be able to exercise some choice about which chemicals they take, whilst stocks left over could be sold on a cash basis³². In more remote villages, we heard complaints that producers wanting to purchase chemicals for cash had to make journeys in excess of 20km to reach the nearest stockist.

This second point highlights the fact that, whilst independent input wholesalers and/or retailers have begun to appear in larger centres within the cotton zones, encouraged in part by the demand for crop protection chemicals for cotton revealed in recent years, there is still a long way to go before a strong network of independent stockists exists to supply cotton farmers with inputs at the village level.

A final, very important issue concerns the transferability of passbook entitlements across seasons. In the early years of the scheme, if an entitlement was not used up in the season

³¹ A total of 19,000 passbooks were distributed at the start of the 2005/06 season, but, because of the drought during that season, many producers either decided not to grow cotton after all or abandoned their crop part way through the season. This illustrates how even the number of passbooks distributed only gives a rough idea of the number of producers in any given year (see section 3.3).

³² Village committees would be required to account for all chemicals delivered by showing either proof of receipt by a passbook holder or cash receipt or by returning unsold chemicals. Of course, one has to be careful not to be left with large unsold stocks that then have to be stored for a year and also not to choke off demand for emerging private stockists. This argues for only sending a small surplus and perhaps for targeting this to villages recognized as less accessible.

for which it was intended, it was lost. This was actually quite a serious tax on producers, as:

- Inadequate quantities of inputs were sometimes delivered to villages.
- Bottles of chemicals are “indivisible”, so it was not always possible to fully exhaust the sum available.

In 2005/06 many producers were unable or reluctant to use up their whole entitlement because of the drought conditions. Thus, TCB announced that unused entitlements could be carried over until 2006/07. Obviously, this creates an additional administrative burden for those handling the passbook system. However, it has several important benefits:

- It is fairer (it removes the tax on those who are unable for whatever reason to exhaust their entitlement).
- It will be particularly important for smaller (poorer) producers if seeds are taken out of the scheme.
- It may help producers reinvigorate their production after a drought, as in 2006/07. By contrast, a rigid system with no transferability across seasons will tend to lock-in weather-induced downswings (as well as upturns) in production. A passbook system with transferability across seasons may thus help to reduce the cyclical variation in production seen so clearly in Figure 2. Bad weather will still have a major impact (as seen in 2005/06), but recovery from a bad season should be swifter.

4.6. Quality control

Lint quality is affected by a number of factors, including seed variety and quality, production practices (especially the effectiveness of spraying), harvesting, post-harvest grading, handling and storage, and ginning (the type and management of gins, additional grading, handling and storage at the ginners).

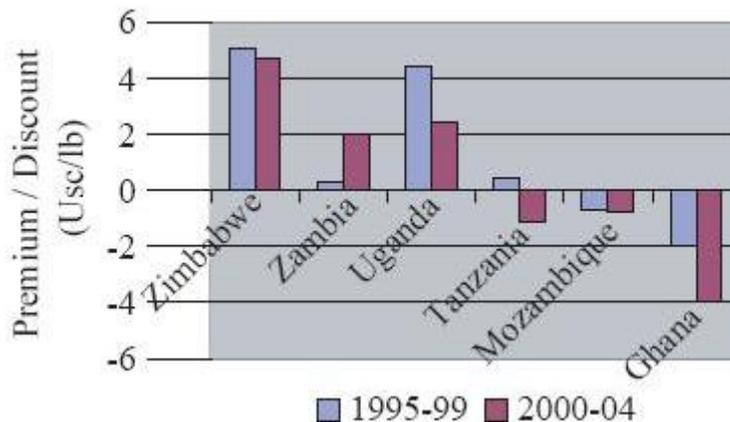
Prior to liberalisation Tanzanian lint regularly enjoyed a premium over the Cotlook A index price. However, there is some evidence that this premium began to fall prior to liberalisation, as grading became lax and lint was no longer considered clean (Gibbon, 1999).

The impact of liberalisation on the quality of lint produced by the Tanzanian sector has been the subject of a lively debate, which is examined in Maro and Poulton, 2004 and Maro and Poulton, 2005a. Gibbon, 1999 reported that lint quality had fallen post-liberalisation because of the mixing of seed types and reduction in producers’ access to crop protection chemicals (both discussed above) and also because buyers prioritised volume over quality at primary marketing in a “scramble” for seed cotton. This latter problem was exacerbated by the precipitous decline in seed cotton production in the latter 1990s, giving rise to chronic over-capacity at ginners (also noted above). In response, Baffes, 2002 argued that private ginners got their lint to market quicker than pre-liberalisation cooperatives had done, which would tend to reduce spoilage during storage.

Moreover, he claimed that price data from Cotlook for Tanzanian lint c.i.f. North Europe showed only a very small decrease in the premium over the A Index (from 10% to 8%) from the seven seasons prior to liberalisation to the seven seasons after. However, this latter argument fails to take into account the tiny share of Tanzanian lint exported to Europe and the fact that this lint is not representative of Tanzanian exports more generally (see Table 6 above).

Figure 6 shows trends in lint prices for Tanzanian lint and other national origins within southern and eastern Africa in the past ten years. These are ballpark figures derived from a survey of 13 international buyers conducted by the “Competition and Coordination” project during late 2004 – early 2005. They show a clear decline in the price of Tanzanian lint, relative to the A index price, since liberalisation.

Figure 6: Average Premium/Discount Over the A Index, 1995 – 99 and 2000 - 04



Source: Larsen and Poulton, 2005

Similarly, although the number of samples was small, International Textile Manufacturers Federation, 2001 reported Tanzanian lint to be some of the most contaminated in the world, along with national origins from Nigeria, Turkey, India, Tajikistan, Pakistan and Uganda. Tanzanian lint samples were found to be contaminated with various fabrics (plastics and jute), string (again, plastics and jute), organic matter, sand/dust, metal/wire and grease/oil.

Beginning in the 2000/01 marketing season, TCB contracted private firms to undertake quality control monitoring (and data gathering) at all operational ginneries. In 2000/01, one firm, ACE (Audit Control and Expertise) received the contract to cover all ginneries in the WCGA. Starting in 2001/02, ACE was entrusted just with the northern zone, whilst a second company, Baltonic, was given responsibility for the southern zone. Subsequently, SGS and Wakefield also entered this business. The functions carried out by these private firms included:

- Monitoring the quality of cotton ginned and of the ginning facilities used.
- Collection and dissemination to the Board (on a weekly and monthly basis) of statistical data and information, including: seed cotton deliveries at each ginnery (i.e. grade, value and source), lint production.
- Drawing samples from all lint bales produced and forwarding them to the Board.
- Control of cotton seed for planting.
- Monitoring the payment of various taxes before lint bales are removed from the ginneries.

The conclusion drawn by researchers (e.g. Larsen, 2003; Maro and Poulton, 2004) was that these companies were ineffective in raising the quality of lint, although they may have performed other useful functions. Reasons for this included:

- principal-agent difficulties in monitoring the activities of hired monitors (typically, unemployed ex-students, who received minimal training prior to their posting) dispersed in numerous ginneries around WCGA;

- a conflict between quality control (which necessitated turning away low quality and/or unsorted consignments of seed cotton at the ginnery gate) and the statistical reporting function, leading to an uneasy collusion between some ginnery managers and their monitors. Especially in seasons of seed cotton scarcity, ginnery managers potentially wanted all consignments to be let in, but also wanted “help” from the monitors in understating volumes (so as to avoid levy payments), making it difficult for them to blow the whistle on monitors who demanded bribes to let unsuitable seed cotton into the ginnery;
- the fact that the inspection companies were paid according to their inputs (number of monitor-months), rather than by outcome (e.g. improved quality).

Fundamentally, however, the fact is that most of the damage to lint quality is done before the seed cotton even reaches the ginnery gate.

Quality control companies would dispute the first three of these points, but might broadly accept the fourth. According to ACE, in 2005 they were responsible for monitoring ten ginneries in WCGA and they rejected 3% of all seed cotton delivered to these ginneries (which, therefore, had to be taken away for sorting before being allowed in). They further claim that their rejection rate had risen over the 2001-2005 period, as they were liable to pay penalties if TCB inspectors found that their staff were not performing their duties effectively [Z.Wilson, *interview, Mwanza 10/1/2007*].

Another factor that may have encouraged improved performance from the inspection companies is that, starting from the 2004/05 marketing season, the basis of their contract with TCB was changed to link their remuneration to ginning throughput (TShs 1 per kg of seed cotton ginned). Although they deny that principal-agent problems ever existed, this would have given the companies a much greater incentive to monitor their own monitors and stamp out collusion between them and ginnery managers. It was also believed to have improved the quality of production statistics.

However, in stakeholder discussions at the Mwanza workshop for the World Bank / Government of Tanzania / European Union review of crop boards in September 2004, there was strong consensus that the critical area for quality control occurs at the point of primary marketing. As originally argued by Gibbon, 1999, the scramble for seed cotton post-liberalisation caused many buyers to prioritise volume over quality at primary marketing. Producers thus had no incentive to sort their seed cotton or keep it clean – and in some cases realised that they could get away with the addition of sand, water or stones. Meanwhile, ginneries who tried to insist on property grading and quality standards found that they lost out to their less discerning rivals.

An objection raised against this line of argument is that, if ginneries receive a decent price premium for higher quality lint from export markets (as is suggested, for example, by Table 6), then they should be able to use this to pay a premium to farmers supplying higher quality seed cotton at their buying posts. Thus, producers of higher quality seed cotton should choose to sell to more quality-conscious companies and there should be no

trade-off between an insistence on quality control on the one hand and capacity utilization on the other.

However, interview evidence from the more quality-conscious companies has always indicated that their insistence on quality control has caused them to forego seed cotton volume. Maro and Poulton, 2005a thus advanced two arguments to explain why higher prices obtained in international markets do not necessarily translate into an ability to pay higher seed cotton prices at buying posts. These are as follows:

There is widespread evasion of the high level of taxes and levies imposed on cotton buying and ginning operations. However, companies with an international brand reputation (currently only three in the Tanzanian sector, but these are all companies interested in insisting on proper grading and quality control practices) perceive it as too risky to their wider brand reputation to be caught in flagrant tax or levy avoidance. They may, therefore, end up paying more in levies and taxes than some of their less quality-conscious competitors, which reduces their ability to pay higher prices at their buying posts.

Meanwhile, companies that are not part of vertically integrated international production and trading operations (i.e. the majority in Tanzania) may find it difficult to translate higher quality lint into higher prices on export markets. This is because – particularly in the case of forward contracts and/or in the absence of reliable HVI reports on lint properties – spinners will be unwilling to pay international traders a premium for Tanzanian lint from an unknown source, given the unreliable reputation of Tanzanian lint as a national origin. International traders, therefore, have no basis on which to offer premium prices to “independent” Tanzanian ginners who sell their lint to exporters.

In the light of this analysis, participants at the Mwanza workshop for the World Bank / Government of Tanzania / European Union review of crop boards recommended that a local auction system be piloted in the 2005/06 marketing season, replacing the current system whereby multiple companies set up competing but separate buying posts in a given village. A single village auction point, operating once per week, could be overseen by TCB-paid inspectors³³. It would make it much more difficult for farmers to sell adulterated cotton and would also greatly enhance the incentives for them to deliver high quality seed cotton to auction.

Following the workshop, the Ministry of Cooperatives and Marketing set up a task force to consider the auction proposal in more detail. As of January 2007, the report of this task force had still not been released. However, it is understood that the task force encountered divergent views amongst stakeholders. There is a legal issue relating to the imposition of a statutory auction system within a previously liberalised market framework. However, other arguments appear to have more to do with interests than compelling technical arguments. Thus:

³³ The proposal was for half of the monitors currently employed in ginneries to be relocated to a peripatetic role overseeing weekly auctions in five villages each.

- The auction system would need to be backed up by adequate warehouse capacity at each auction venue (a point the proponents recognised). Most current warehouse capacity at village level is owned by cooperative primary societies and cooperative unions saw this as an opportunity to reclaim a more prominent role in cotton marketing – something that private buyers would understandably want to resist;
- Whilst some private buyers are supporters of the auction proposal, not all buyers want to see greater transparency in seed cotton marketing.

Having listened to a number of arguments during field work in January 2007, we remain of the view that the benefits of an auction system are likely to outweigh the costs and that a pilot project, therefore, should be undertaken. An issue raised repeatedly in focus group discussions was the mistrust that farmers have of many private buyers, whom they believe regularly tamper with scales. (TCB staff confirm that some tampering does take place. However, currently they do not have the resources for anything more than occasional checking of scales). Focus group participants stated openly that farmers adulterate their seed cotton with sand, water and rocks, but argued that this was in part their way of compensating for the loss of weight (and hence income) due to fiddled scales. Restoring confidence in weights and measures does seem to be a necessary (though certainly not sufficient) step if the quality of Tanzanian cotton is to be improved. Weekly village auctions are one of the few ways that monitoring of all scales could be contemplated on the basis of available human resources.

In the meantime, TCB did not renew the contracts of the inspection companies for the 2006/07 marketing season. The official reason for this is that the change in funding basis for TCB following the April 2006 memorandum of understanding meant that TCB could no longer afford to employ them. Despite this, there are several factors that may have contributed to an improvement in the average quality of Tanzanian lint during the past couple of seasons. These are:

- The wider availability of chemicals through the passbook scheme;
- The introduction of UK91 seed;
- In 2005, but not 2006, the greatly increased production and hence capacity utilisation levels at ginneries, which should have reduced the “scramble” for seed cotton on the part of ginners.

TCB has also been encouraging district authorities to collaborate in the campaign to raise seed cotton quality. At the village level, village executive officers (VEOs) are supposed to be vigilant about cotton quality practices in their villages at cotton marketing time. However, this is an additional responsibility for VEOs, who are not paid to deal with crop quality, so response has been uneven. In Bariadi, the district administration has reportedly taken the campaign for better quality cotton quite seriously, with the result that an area that previously supplied notoriously poor quality cotton has now improved somewhat [J.Bwahama, *interview, Mwanza 16/1/2007*].

4.7. Pricing of seed cotton

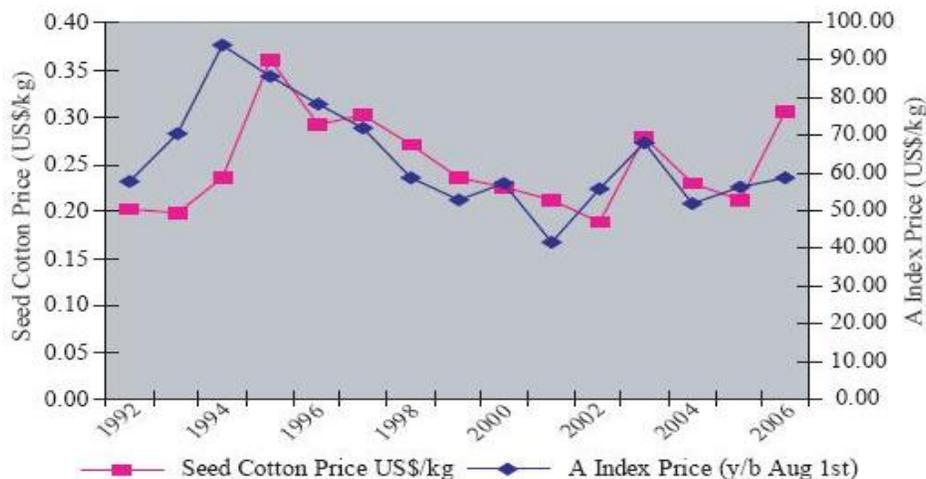
Whilst highly competitive cotton sectors, such as Tanzania, are observed to struggle with “coordination” challenges (e.g. providing inputs on credit to producers, ensuring grading at primary purchase), they should deliver higher seed cotton prices to producers than more concentrated sectors.

According to World Bank / Government of Tanzania, 2004 (p28), the real producer price for seed cotton fell by 8-10% between 1987-94 (the years immediately before liberalisation) and 1995-2002 (the years immediately after). However, this change can be decomposed as follows (effect on producer price in brackets):

- Decline in world price (-10%);
- Real exchange rate appreciation (-25%);
- Increase in producer share of lint price (+25%);
- Increase in quality premium (+3%, but see section 4.6, which casts doubt on this).

Figure 7 shows that changes in international lint prices are readily passed on to producers by the highly competitive Tanzanian seed cotton marketing system.

Figure 7: A Index Price and Domestic Seed Cotton Price, 1992 - 2006



Source: TCB, ICAC data

Meanwhile, Table 9 shows the share of the international lint price received by Tanzanian producers in the years immediately prior to and since liberalisation. From 1990-94 the mean share of the c.i.f. export price received by producers was 45%; from 1995-2006 it has been 59%. This latter figure compares favourably with the mean figure for Zimbabwe over the same period of 55%.

Table 9: Seed Cotton Prices and Producer Shares of c.i.f. Lint Price 1990-2006

		90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Seed Cotton Price	TShs / kg	41	70	60	80	120	207	170	185	180	175	180	185	182	290	250	240	365
Seed Cotton Price	US\$ / kg	0.21	0.32	0.20	0.20	0.24	0.36	0.29	0.30	0.27	0.23	0.23	0.21	0.19	0.28	0.23	0.21	0.29
A Index Price (y/b Aug 1st)	US\$ / kg	1.82	1.39	1.27	1.55	2.07	1.88	1.73	1.59	1.30	1.16	1.26	0.92	1.23	1.50	1.14	1.24	1.30
A Index Price (with premium)	US\$ / kg	1.85	1.41	1.29	1.57	2.08	1.89	1.73	1.59	1.29	1.15	1.24	0.90	1.21	1.48	1.12	1.22	1.28
Payment to producers	US\$ / kg	0.64	0.97	0.61	0.60	0.71	1.09	0.89	0.92	0.82	0.71	0.68	0.64	0.57	0.85	0.70	0.64	0.84
Producer share of CIF/CFR	%	34%	69%	47%	38%	34%	58%	51%	58%	64%	62%	55%	71%	47%	57%	62%	53%	65%

Source : Authors

Notes :Assumptions: US\$2.6/kg premium over A Index price 1990, then US\$0.4/kg loss per year until 2003, after which US\$0.4/kg recovery per year until 2006; ginning out-turn ratio = 33%, except 2006 = 35%

Of course, several factors complicate simple inter-country price comparisons. However, whilst transport costs for Tanzanian lint (both from ginnery to port and from port to Asian markets) are lower than for Zimbabwean lint, Tanzanian cotton faces higher taxes and levies than Zimbabwean. Note, too, that the producer prices on which Table 9 is based are net of CDF contributions. If the TShs 15 per kg that producers have paid to CDF since 1999 is added to the seed cotton price for these years, then the average share of the international lint (c.i.f.) price received by producers since liberalisation rises to 61%.

Table 10 illustrates the high burden of taxes and levies that has been a common feature of export crop sectors in Tanzania. In 1999 Ministry of Agriculture reported that the total burden of local taxes and levies and payments to TCB amounted to TShs 24.3 per kg of seed cotton at a time when the seed cotton price was around TShs 175 per kg (reported in Maro and Poulton, 2002). Table 10 shows that the burden of taxes and levies per kilo of seed cotton sold had risen further by 2002, at a time when the seed cotton price was still only around TShs 182 per kg. Note that most farmers still did not access chemical inputs in 2002, despite paying the CDF levy that paid for importation of chemicals.

Table 10: Taxes on Cotton Marketing 2002

Nature of Charge	Basis	Charge per Kg of Seed Cotton
CDF Levy	TShs 20 per kg	20
TCL&SB Levy		4.5
District Levy	5% of seed cotton price	9
Education Levy		5
Ginning Licence	US\$1100 per company	0.14
Export Licence	US\$1000 per company	0.12
Trade Licence	US\$570 per company	0.07
District Licences	TShs 150,000 per district	0.07
Buying Post Licences	TShs 20,000 per buying post	0.25
Total		39.15

Source: Maro and Poulton, 2004, p24

During the 2004-05 marketing season, the world price of lint began to slide as seed cotton was being purchased in Tanzania. This fed very quickly through to producer prices, as few companies had hedged their prices or committed to forward contracts. The government feared that the rapid fall in producer price would undermine all the positive feeling around cotton generated by the record harvest that year, so agreed to waive levies worth TShs 15 per kg of seed cotton as a way of temporarily sustaining the producer price.

The effects of fluctuations in the domestic harvest can also be seen in recent pricing movements. In 2005 a second record harvest reduced the intensity of price competition, but the much reduced harvest in 2006 greatly intensified it (Figure 7 and Table 9).

Prices in 2006 were also assisted by the memorandum of understanding signed in April and the conscious decision by the new government to reduce the burden of taxes and

levies paid by private stakeholders within the sector. Thus, in 2006/07 the only levies that remain out of those listed in Table 10 are the district levy and the CDF levy³⁴. Not only have the TCB and education levies been abolished, but license fees have also been scrapped, although companies do still have to apply for the licenses in question.

Finally, since liberalisation TCB has announced an indicative seed cotton price at the start of each marketing season. (Until 2005 the marketing season officially commenced on July 1st each year). This came under criticism from researchers (e.g. Baffes, 2002; Maro and Poulton, 2004), as the price set tended to be a conservative one, with actual prices quickly rising 50% above the indicative price in some years. Therefore, producers who sold early (including some poorer, cash-strapped producers) found that, far from being protected by the indicative price, they were lulled into a false confidence by it and reported during surveys that they blamed TCB for the low price that they had received. As from the 2005/06 marketing season, the practice of announcing an indicative price has been scrapped (Tanzania Cotton Board, 2005).

Without the indicative price, producer prices in 2006 opened at TShs 270 per kg (US\$0.225 per kg) in June, then rose to around TShs 380 per kg by August. The final scramble for cotton in September and October saw prices finish at TShs 440 per kg or above in some villages. Based on TCB figures on the flow of seed cotton into ginneries during the 2006/07 marketing season, we estimate an average producer price of TShs 365 per kg.

5 COST COMPETITIVENESS, RETURNS TO PRODUCERS AND SUSTAINABILITY

This section relies heavily on two (sets of) budgets, calculated during fieldwork in January 2007:

- An illustrative ginner's budget, that attempts to summarise the costs incurred by a medium-sized ginnery in assembling and ginning seed cotton in 2006;
- Illustrative budgets for seed cotton production by each of the three farmer types identified during focus group discussions.

5.1. Processing and Marketing Costs in Tanzania

Our illustrative ginnery budget is presented in Appendix Table 2. This is compiled from a range of information sources and so does not reflect the costs at any specific ginnery. However, the costs incurred perhaps most closely reflect the costs of purchasing and running roller ginning equipment.

³⁴ 30% of the value of the district levy is returned to the village in which the seed cotton was bought. The CDF levy is apportioned as follows: TShs 15 per kg as passbook entitlement; the remaining TShs 5 per kg paying for administration of the passbook system and contributing to research funding.

Assumptions underlying the budget are presented in Appendix Table 2 panels A-B. Attention is drawn in particular to the low capital costs. Most of the ginning equipment installed in Tanzania since liberalisation has been second-hand. Where new double roller gins have recently been purchased, they have tended to be bought from Bajaj in India, which has been offering very competitive prices.

Energy costs are estimated at 10% of total ginnery costs. However, where a ginnery is not connected to the national grid, as is the case with several of the more rural ginneries, energy costs could be double those presented here.

We set as the base case for Appendix Table 2 a good year scenario (such as 2003/04 or 2004/05), where the harvest is plentiful, so the mean producer price is at its post-liberalisation average as a share of the international price (59%) and the ginnery can operate for 150 days (i.e. at around 80% capacity). Under such circumstances, the Tanzanian cotton sector is extremely cost competitive on the international market and hence highly profitable.

In Table 11 we show what happens when we relax some of these happy assumptions. Even with the drought-induced scarcity of seed cotton supplies and hence low capacity utilisation plus generous producer prices paid in 2006 (scenario 2), the ginnery returns a small profit. Comparison of this scenario with scenario 1 shows that, in fact, the level of capacity utilisation does not make a huge difference to ginnery profitability in Tanzania. This is due to the low capital cost of the ginnery and helps explain how Tanzanian ginneries survive the large fluctuations in national production that were shown in Figure 2.

Table 11: Simulating Ginnery Profitability Under Different Scenarios

				Retaining Same Profit Level
	Scenario	Assumptions	Profit per kg of lint (US\$)	Mean Seed Cotton Price Payable (TShs/kg)
0	Base ("good year")	Producers receive 59% of c.i.f. = TShs 320/kg; operate for 150 days	0.16	-
1	2006 Producer price	Producer price = TShs 365/kg	0.05	-
2	2006 "actual"	Producer price = TShs 365/kg; operate for 90 days	0.04	-
3	Lower lint quality	10% discount on Index A	0.06	278
4	Higher lint quality	2% premium over Index A	0.21	340
5	Higher ginning out-turn	g.o.t. = 0.4	0.24	360

Scenario 3 considers the impact of receiving an even lower lint price, due to excessively poor quality. Profitability is cut to less than 40% of what it was in the base case³⁵, but, under the favourable harvest conditions assumed in the base scenario, the ginnery still manages a small profit. If, however, the company received this lower lint price when seed cotton was also scarce (i.e. a combination of scenarios 2 and 3 – not reported in the table), then it would make a loss of equal magnitude. We infer from this that some companies that received such discounts in the past made short-term losses and either exited the sector or learned from their worst errors.

By contrast, receiving a 2% premium over Index A would allow the company to pay producers an extra TShs 20 per kg (6%). In the context of a scramble for seed cotton, it is possible to see how this higher price to producers could be matched by competitors through underpayment of tax.

Finally, scenario 5 shows the benefits that the sector could obtain if research produced a local seed variety capable of delivering a ginning out-turn of 40%, instead of the 36% assumed for a roller gin in Appendix Table 2. This higher out-turn would increase ginnery profits by 50% compared with the base case or alternatively would allow a TShs 40 per kg (12%) increase in producer price, holding ginnery profits constant.

5.2. Cost Competitiveness at Farm Level

Focus group discussions were held in two villages in each of Kwimba and Bariadi districts in January 2007. The villages were chosen by district officers, with one accessible and one more remote village being visited in each district. Five to twelve respondents participated in each discussion, which lasted two-three hours. As an initial exercise within the first three focus group discussions, the participants grouped a sample of the households in their village into three or four groups, according to the extent of their cotton production³⁶. Once groups were identified, a series of questions was asked about typical household characteristics and livelihood profiles of households within each group, as well as about their cotton production activities. Finally, a cotton production budget was constructed for each group.

Farmer production budgets for each of the farmer types identified by the focus groups are presented in Appendix Tables 3-5. We note that these budgets assume relatively high seed cotton yields - compatible with national average data for 2003/04 and 2004/05 – but

³⁵ Alternatively, to maintain the level of profitability assumed in the base scenario, the average seed cotton price that the company could pay would fall from TShs 320 per kg to TShs 278.

³⁶ Reflecting the history of “villagization” in Tanzania, villages in these districts are large: 500-1100 households in the villages we visited. In only one case was a complete list of households available. However, partial lists were available in all cases and names of 60-100 household heads (selected more or less randomly) were noted on cards. The exercise then proceeded much like a conventional PRA wealth ranking exercise. In all three villages, households were initially divided into three groups – on the basis of their cotton production activities, rather than overall wealth (which, as it turns out, is quite closely correlated). However, in one of the villages, the group with the lowest cotton production was subsequently subdivided into two. For presentation purposes here, these two sub-groups have been re-aggregated.

use prices that were realised in the shortage year of 2005/06. Thus, they should perhaps be thought of as “best case” budgets.

We also note that area planted and yield are positively correlated across these budgets, whereas the evidence from the producer surveys is less clear about this (Table 2).

Table 12: Analysis of Costs and Returns from Farmer Budgets (US\$)

	TShs/acre	US\$/acre	PPP US\$
Group 1			
Gross Revenue	171000	142.50	
Margin After Payment of Inputs	153800	128.17	
Input Cost / Gross Revenue	0.10		
Gross Margin (excl family labour)	69825	58.19	
Returns to family labour	5819	4.85	
Net Margin (after family labour)	55425	46.19	
Break-even Cost per kg	257	0.21	
Gross margin from all cotton	698250	US\$581.88	1256.86
Income per capita if:			
Household Size = 6	116375	96.98	209.48
Household Size = 12	58188	48.49	104.74
Group 2			
Gross Revenue	96000	80.00	
Margin After Payment of Inputs	87360	72.80	
Input Cost / Gross Revenue	0.09		
Gross Margin (excl family labour)	47260	39.38	
Returns to family labour	1525	1.27	
Net Margin (after family labour)	10060	8.38	
Cost per kg	286	0.24	
Gross margin from all cotton	189040	US\$157.73	340.70
Income per capita if:			
Household Size = 6	31507	26.26	56.72
Household Size = 12	15753	13.13	28.36
Group 3			
Gross Revenue	49000	40.83	
Margin After Payment of Inputs	46360	38.63	
Input Cost / Gross Revenue	0.05		
Gross Margin (excl family labour)	45860	38.22	
Returns to family labour	1245	1.04	
Net Margin (after family labour)	1660	1.38	
Cost per kg	271	0.23	
Gross margin from all cotton	68790	US\$57.33	123.83
Income per capita if:			
Household Size = 6	11465	9.55	20.63
Household Size = 12	5733	4.78	10.32

Source: focus group discussions

Table 12 presents a number of indicators of costs and returns that can be derived from these budgets. Bearing the above caveats in mind, we note that:

- Costs of production per kg of seed cotton are low in absolute terms and are lowest for the most productive group.
- All groups produce at comfortably below the average seed cotton price that was paid in 2006. However, if group 2 or 3 producers had sold all their seed cotton at the season's opening price in 2006, they would have made losses (despite the fact that the budgets assume a higher yield than would generally have been attainable in 2006).
- Input costs only account for a tiny share of farmers' gross revenue from cotton in Tanzania. This reduces their risk in production. However, as will be seen below, the corollary of the limited capital input into production is that returns to producers are also low.

Unfortunately, we cannot estimate what proportion of farmers fall into each of the three groups based on the information collected during the focus group discussions, as our sampling process was not truly random. We note that, according to the 2004 household survey, only 36/238 cotton producing households (i.e. 15%) used a hand hoe to prepare their land³⁷ – a characteristic of (some) group 3 farmers according to the focus groups. This would suggest that group 3 is fairly small. By contrast, 70 achieved a yield of 175 kg/acre or less, suggesting that group 3 could represent around one third of producers.

5.3. Return to Farmers and Poverty Alleviation Considerations

Table 12 also provides insights into the incomes that the different types of households derive from their cotton production. From this table, we observe the following:

- Returns to labour are moderately attractive for group 1 households, where household labour is essentially a managerial input supervising hired labour. However, returns are lower than they are in Zimbabwe, where labour is combined with a much higher level of capital input.
- For the smallest producers, returns to labour are very similar to what they could obtain from hiring out their labour to others³⁸.
- When converted into purchasing power parity dollars, the income per capita from cotton production (net of input costs, but excluding the cost of family labour) gives group 1 households a fair chance of being non-poor in MDG terms. According to the focus group participants, these households often also have a sizeable herd of cattle and/or some business income (or, in the accessible villages, possibly even a

³⁷ These households tended to cultivate a smaller area of cotton and achieve lower yields than the sample average, though not all the differences between means are statistically significant.

³⁸ This, of course, assumes that one can specify the wage rate for hired labour in these areas. In fact, the implicit wage rates paid for hired labour vary quite considerably across the different activities of the cotton production cycle. Moreover, when asked to suggest a wage rate for hired labour, respondents in the two accessible villages gave figures that were double those given in the remoter villages. This suggests that labour markets are quite segmented. We did not ask how confident a person could be of obtaining casual employment at the wage rates quoted.

salary). However, the participants also reported that group 1 households are often (but not always) large – in polygamous households, 20 or more people. Income per capita, therefore, depends on the number of dependents.

- By contrast, group 2 and 3 households are clearly poor in MDG terms. As well as having a lower cotton income than group 1, they tend to have smaller livestock herds, grow smaller areas of food crops and are less likely to have business income. Cotton production plays an important part in the current livelihood strategies of these groups, because cotton has a guaranteed market, so can be relied upon to generate some cash. However, the cash sums are not large. Thus, cotton production effort will depend very much on prevailing prices and the quality of other services supplied to cotton producers. Focus group members noted a number of other crops that households could grow – mainly for subsistence, but also allowing them to sell small quantities to local markets – in addition to, or instead of, cotton³⁹. These included rice, maize, (sweet) potatoes, peas, green grams and groundnuts. The modest returns to cotton in most years, plus the range of alternatives (even if they also only offer modest returns), go some way towards explaining the high variability in cotton production observed in Figure 2.
- Whilst group 2 producers have some resources (land, plough and oxen) with which to expand cotton production if the potential profitability of cotton production improves, group 3 households face major production constraints that limit the extent to which they can respond to better prices - or even services - in the short term. Thus, they are likely to remain poor under any plausible scenario of enhanced cotton sector performance.

Given that both group 2 and 3 households are likely to sell some (or all) of their cotton soon after the buying season opens, the returns that they achieve from cotton production are critically dependent upon the opening price set by the companies. As was argued earlier, it is extremely difficult for TCB to influence this price for the benefit of these poorer producers. However, other agencies working in these areas might consider interventions (such as inventory credit schemes) that would permit producers to hold onto their cotton beyond the first couple of weeks, so that prices can rise before they sell.

We argue below that a more intensive production model is required if cotton production is to have a bigger impact in terms of poverty reduction. However, we also note that, as well as enhancing the incomes of those producing cotton on their own account, improved cotton sector performance should raise demand for hired labour in cotton producing zones. The farmer budgets indicate that group 1 households hire in considerably more labour than they apply themselves to their cotton plots, whilst group 2 households are also regular hirers of labour (although some household members may also hire labour out).

³⁹ Only in one village – Nyamalapa in Bariadi – did we record areas grown to crops other than cotton. In all four groups identified in this village, cotton occupied around 50% of area cultivated.

5.4. Sector Sustainability

Soil fertility is a key issue for the Tanzanian cotton sector. Smallholder production of cotton in Tanzania is low cost, hence internationally competitive, fundamentally because producers are able to obtain tolerable seed cotton yields with very little capital investment, thanks to the continuing fertility of their soil.

In the areas that we visited, there were some indications that this is changing. Kwimba is known to have plenty of sandy soils and the 2002 and 2004 household surveys picked up that use of manure on cotton had begun sooner there than in Bariadi. In Malya village some group 1 farmers were reported to buy manure for application on their cotton. In Bariadi, by contrast, awareness of the need to use manure is only just beginning to grow. However, respondents in both villages in Bariadi confirmed that fallow has now disappeared from their cropping systems and reported that, on some plots, a falling yield trend has been observed for some time.

Over time, these farmers will need to increase their investment in soil fertility maintenance if they are to continue to benefit from cotton. On the one hand, this can be seen as an additional cost, hence lowering returns. However, if institutional arrangements are put in place to assist such producers to intensify their cropping systems, then returns should ultimately rise. There are at least two problems here. The first is that the passbook system - an excellent fix within a competitive market model for the pressing input challenge of recent years - is not really equipped to support fertiliser use. Table 8 showed the levels of entitlements that producers currently obtain through it. Adding expensive fertiliser into the passbook system would necessitate a huge increase in the CDF levy.

Farmers' own innovation suggests that promoting greater manure use is a more promising option in the short-medium term than trying to promote much inorganic fertiliser. (There is also an unanswered research question about how responsive current cotton seeds are to fertiliser application). However, promoting greater manure use should really be part of a wider programme to link the development of livestock and cotton in WCGA, with livestock providing both draught power⁴⁰ and manure, whilst cotton revenues permit investment in livestock herds. This is an agenda that goes beyond the remit of TCB, CDF or cotton companies. However, it is recommended that industry stakeholders work with local government extension staff and NGOs to develop joint extension programmes, possibly with credit linked into cotton revenues. There is an increasing number of responsive funding windows that might respond favourably to proposals of this nature.

The second difficulty, however, concerns company incentives to do this. WCGA is a large area and an alternative – and possibly easier – way of expanding their production levels is to extend the extensive production model to new areas. This will incur additional transport and other logistical costs, but existing institutional arrangements should suffice. Existing production might not be sustained – it would not be the first example of cash

⁴⁰ There may be potential to introduce ox-drawn planters and/or weeders to complement already quite high levels of plough use [Ali Goronya, *pers.comm.*, 13/1/2007].

crop production migrating across a territory, leaving behind soils no longer fertile enough to support competitive production – but it could be replaced by production in new areas.

Both for environmental reasons and because intensified production should ultimately bring greater poverty reduction impact than the current extensive production model, we hope that the sector decides to confront the soil fertility challenge head on.

6 LESSONS LEARNED

From a comparative perspective, probably the major lesson to learn from the experience of the liberalised Tanzanian cotton sector is that its highly competitive market structure has presented significant challenges in relation to seed supply, quality control and seasonal credit, even if it is desirable from the point of view of seed cotton pricing. With time and lesson learning, it has been possible to devise institutional arrangements to respond to the immediate challenges on the input side, and a proposal does exist (local auctions) to improve incentives for quality. After several years of doubt at the turn of the millennium, in 2004 and 2005 a new optimism has been injected into the sector (Tanzania Cotton Board, 2005).

We also affirm the positive news that the competitive market structure has delivered good prices to producers. However, further development of institutional arrangements to support production intensification is necessary if these are to translate into attractive returns for producers.

Central to the process of devising new institutional arrangements for the sector has been cooperation between a group of leading ginners and TCB. Their working relationship has not always been easy, but over time a degree of trust has built up between them that bodes well for the future. There is still scope to further increase the influence of ginners within the governance of the Tanzanian sector, as well as to strengthen the voice and capabilities of producers' representatives within policy making processes. However, as long as the Tanzanian sector retains its highly competitive structure (i.e. numerous ginners, none of them dominant), there will be a vital role for TCB in ensuring that important strategic decisions are taken to promote sector development.

Meanwhile, there remain a number of key weaknesses in the sector, which hold back both its competitiveness and its poverty reduction impact. In one way or another, the highly competitive market structure can be seen as an obstacle to remedying these weaknesses. Whilst UK91 is an important step forward – appreciated by farmers, delivering a slight increase in lint out-turn for ginners – the whole seed system (from varietal development through to multiplication and distribution to producers) remains weak. The local auction system still remains just a proposal and little else has been done to improve quality whilst the auction proposal is under consideration. Moreover, as was emphasised in the previous section, soil fertility remains a major medium-to-long term challenge for the sector, but one to which current institutional arrangements are ill-equipped to respond.

Looking forward, we expect production to continue to expand. There is plenty of ongoing private investment in the sector to give confidence that this will happen. However, whether future production increases come mainly from a geographical expansion of the

extensive production model - using limited capital and heavily dependent on pre-existing soil fertility for its viability – or whether a more intensive model can be promoted remains to be seen. The extensive model can almost certainly continue because of the large under-exploited land area within WCGA. However, whilst it is low cost (good in an age of low international prices), it also generates limited returns to producers and is ultimately environmentally undesirable. Without further institutional innovation to assist production intensification, the poverty reducing impacts of continued industry expansion could be modest.

ANNEX 1: DATA AND STATISTICS

Table 1: Seed Cotton Production by Region, 1999/00-2005/06

Region	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Shinyanga	57466	69913	80030	119009	88352	204626	234193
Mwanza	31551	41376	46685	43699	31306	90974	91871
Mara	2822	4286	13091	11361	11349	24128	28288
Kagera	431	2087	3117	2309	3476	7091	14197
Tabora	4757	5725	4613	11409	4332	10560	5089
Kigoma	15	4	18	19	62	542	697
Singida	0	27	21	8	39	481	484
TOTAL WCGA	97042	123418	147575	187814	138916	338402	374819
Manyara	6	6	130	119	224	829	781
Morogoro	171	35	242	348	523	1948	875
Mbeya	2934	0	0	0	0	0	0
Kilimanjaro	32	4	21	16	36	26	6
Pwani	18	8	9	122	33	190	45
Tanga	209	89	15	103	70	140	58
Iringa	169	29	150	59	17	54	7
TOTAL ECGA	3539	171	567	767	903	3187	1772
TOTAL Tanzania	100581	123589	148142	188581	139819	341589	376591
Share WCGA	96.5%	99.9%	99.6%	99.6%	99.4%	99.1%	99.5%
Shinyanga & Mwanza	88.5%	90.0%	85.5%	86.3%	85.6%	86.5%	86.6%

Source: TCB data

Note: The years in this table refer to the production season (November to June). By contrast, TCB present their data by marketing seasons, with each marketing season running from July 1st to June 30th. Thus, the 2003/04 production season generates the 2004 harvest, which is recorded by TCB as the figure for the 2004/05 (marketing) season.

Table 2: Indicative Ginnery Budget

Exchange Rate	1200							
Gor	36%		200	bale weight (kg)				
Wastage	2%							
Seed Loss	3%							
Seed Given To TCB	5%							
Capacity Of Ginnery (Tons Lint/Day)	42	Tons lint/day	210	bales/day				
Capacity/Year	6300		150	days				
	cost/kg seed cotton		cost/kg lint cotton					
	TShs	\$	TShs	\$				
Buying Commission To Coops	15.00	0.01		0.03				
Purchase Team Salary	1.80				3 agents x200000TShx12months for 4000T			
Transport Of Purchasing Team	0.75				200km/weekx20 weeksx 750TSh/km for 4000T			
Transport Of Seed Cotton	22.00				Tsh/t/km	220	av.distance	100
Purchase Price Of Seed Cotton	320.00							
CDF Levy (\$0,01932/Kg SC)	23.18							
District Taxes (5% Price)	16.00							
Financing Cost	8.80				interest rate	11%	months	3
Cost At Ginnery Gate	398.73	0.33	1,107.59	0.92				
Ginnery Costs								
Amortization Of Ginnery			5.71	0.005	cost (US\$)	300000	years	10
Amortization Of Construction			0.95	0.001	cost (US\$)	100000	years	20
Amortization Of Warehouse			1.14	0.001	cost (US\$)	120000	years	20
Energy			11.31	0.009	KwH	250	unit cost	79.2
Casual Salary			4.40	0.004	44 x 3 shifts x 1500 sh for 45 tons/day			
Permanent Staff			14.29	0.012	5 x 3shifts x 500000sh per month (26 days at 45 tons)			
Maintenance Cost			10.00	0.008	25 Tsh/kg in WCA, but capital cost much higher in WCA			
Packaging			50.00	0.042	TShs/bale	10000		
Capital Cost			5.45	0.005	Total Cost/2 * interest			
Overhead (Management, ...; 10%)			10.33	0.009	O/H rate	10%		
Total Ginnery Costs			113.58	0.095				
Value Of Seed Sale (Deduct)			90.00	0.075	seed P/kg	60		

Total Cost Ex Factory (F.O.T.)			1,131.18	0.943	US\$/lb	0.43		
Transport To Dar			75	0.063	TShs/bale	15000		
Warehousing + Port Charges			50	0.042	Abidjan cost			
F.O.B. Cost			1,256.18	1.047	US\$/lb	0.48		
Sea Freight				0.044	container (US\$)	1100	weight (tons)	25
Cfr Cost (Far East)				1.091	US\$/lb	0.50		
A Index				1.28	US\$/lb	0.58		
Price After Discount				1.254	US\$/lb	0.01		

Table 3: Budget for Group 1 Farmers (assuming manure is used)

No.of acres cultivated	10				
Yield (kg/acre)	450				
Price Received	380				
2006 Exchange Rate (US\$1=)	1200				
Wage rate	1200				
Production Practices					
Manure Application	yes - 3 carts (one ton each) every 3 years				
Land Preparation	own plough				
Planting	row planting, hired labour				
Weeding	3 times, hired labour				
Spraying	3 times, own pump				
Harvesting	hired labour				
Transport	own cart				
Time of sale	wait				
	Units	Unit Cost	No.of Units	Total	Notes
Family/Management Time					
Manure Application	Man-days			1	
Land Preparation	Man-days			1	
Planting	Man-days			1	
Weeding	Man-days			3	
Spraying	Man-days			1	
Harvesting	Man-days			4	3 workers + manager doing 10 tins per day
Transport	Man-days			1	
TOTAL				12	
Hired Labour, Services or Opportunity Cost					
Transport (manure to field)	cart opp.cost	4000	1	4000	
Manure Application	Man-days	1200	3	3600	spreading (labour estimate from Dr.Mafuru)

Land Preparation	plough opp cost	15000	1	15000	
Planting	Man-days	2500	3	7500	too high?
1st Weeding	Man-days			13000	
2nd Weeding	Man-days			10000	
3rd Weeding	Man-days			8000	
Spraying	pump opp cost	500	3	1500	
Harvesting	debe (3kg)	150	112.5	16875	
Transport (field-house)	cart opp.cost	4000	0.5	2000	unit cost depends on distance, can get 700-900kg in one cart
Transport (house-market)	cart opp.cost	5000	0.5	2500	unit cost depends on distance, can get 700-900kg in one cart
TOTAL				83975	
Input Costs					
Manure	ton	7000	1	7000	This is recommended rate; farmers' estimates were higher than this.
Seed	kg	120	10	1200	
Pesticide	bottle	3000	3	9000	
TOTAL				17200	

Table 4: Budget for Farmer Group 2

No.of acres cultivated	4				
Yield (kg/acre)	300				
Price Received	320				
2006 Exchange Rate (US\$1=)	1200				
Wage rate	1200				
Manure Application	no				
Land Preparation	own/hired plough				
Planting	broadcast, family labour				
Weeding	3 times, family/hired labour				
Spraying	2 sprays, hired pump				
Harvesting	family/hired				
Transport	hire cart				
Time of sale	progressive				
	Units	Unit Cost	No.of Units	Total	Notes
Family/Management Time					
Land Preparation	Man-days			1	
Planting	Man-days			2	done at same time as ploughing; may be done by children
1st Weeding	Man-days			1	
2nd Weeding	Man-days			12	
3rd Weeding	Man-days			8	
Spraying	Man-days			1	
Harvesting	Man-days			5	2 workers + 2 family doing 10 tins per day
Transport	Man-days			1	
TOTAL				31	
Hired Labour, Services or Opportunity Cost					
Land Preparation	plough (opp) cost	15000	1	15000	
Planting	Man-days				

1st Weeding	Man-days			13000	
2nd Weeding	Man-days				
3rd Weeding	Man-days				
Spraying	pump hire	500	2	1000	hire from gov = TShs200, but batteries? Private hire = TShs500
Harvesting	debe (3kg)	150	50	7500	
Transport (field-house)	cart opp.cost	4000	0.4	1600	unit cost depends on distance, can get 700-900kg in one cart
Transport (house-market)	cart opp.cost	5000	0.4	2000	unit cost depends on distance, can get 700-900kg in one cart
TOTAL				40100	
Input Costs					
Seed	kg	120	22	2640	
Pesticide	bottle	3000	2	6000	
TOTAL				8640	

Table 5: Budget for Farmer Group 3

No.of acres cultivated	1.5			
Yield (kg/acre)	175			
Price Received	280			
2006 Exchange Rate (US\$1=)	1200			
Wage rate (TShs/day)	1200			
Manure Application	no			
Land Preparation	hand hoe, family labour			
Planting	broadcast, family labour			
Weeding	once, family labour			
Spraying	no spray			
Harvesting	family			
Transport	carry themselves			
Time of sale	immediately			
	Units	Unit Cost	No.of Units	Total
Family/Management Time				
Land Preparation	Man-days			14
Planting	Man-days			2
Weeding	Man-days			14
Spraying	Man-days			
Harvesting	Man-days			6
Transport	Man-days			1
TOTAL				37
Hired Labour, Services or Opportunity Cost				
Land Preparation				

Planting	Man-days			
Weeding	Man-days			
Spraying	pump hire			
Harvesting	debe (3kg)			
Transport (field-house)	wheelbarrow			
Transport (house-market)	wheelbarrow	500	1	500
TOTAL				500
Input Costs				
Seed	kg	120	22	2640
Pesticide	bottle			
TOTAL				2640

Appendix Table 6: PPP Conversion Factors

		2001	2002	2003	2004	2005	2006	
1	GDP (US\$bn)	9.4	9.8	10.3	11.3	12.6	13	
2	GDP PPP (US\$bn)	18.9	20.7	22.6	24.7	27.1	29.7	
3	GDP per capita (US\$)	274	278	286	309	336	339	
4	GDP per capita PPP (US\$)	549	587	629	674	723	777	
								Average
	PPP factor (1) = 2/1	2.01	2.11	2.19	2.19	2.15	2.28	2.16
	PPP factor (2) = 4/3	2.00	2.11	2.20	2.18	2.15	2.29	2.16

Source: <http://www.dfat.gov.au/geo/fs/zimb.pdf> (downloaded 16/3/2007)

Note: 2006 data are IMF estimates

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