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Design Capabilities and Potential in “The Cotton and Textiles Sector in Tanzania: Issues and Opportunities. A report for the Tanzanian Government”

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THE COTTON AND TEXTILES SECTOR IN TANZANIA:

ISSUES AND OPPORTUNITIES

Report to the Government of Tanzania supported by the Tanzania Gatsby Trust and the Gatsby Charitable Foundation

Tanzania Gatsby Trust
Samora/Morogoro Rd
3rd Floor PPF House
P. O. Box 8695
Dar es Salaam
Tanzania

September 2007

Preface and Acknowledgements

This study originates from discussions between the Honourable Juma Ngasongwa, Minister of Planning, Economy and Empowerment and the Honourable Basil Mramba, Minister for Trade and Industry, and Lord David Sainsbury, settlor of the Gatsby Charitable Foundation (GCF), in January 2007. In discussions held in Dar es Salaam, it was agreed that GCF and its associated trust, the Tanzania Gatsby Trust (TGT), would fund an exploratory study of the cotton and textile sectors with a view to identifying issues, constraints and investment opportunities. The focus of the study would be on the long-term potential for a major increase in the output of Tanzania's cotton and textile sector with a view to maximising its potential contribution to the generation of increased GDP, exports, farmer incomes and manufacturing employment. Terms of Reference were finalised in February and the report was completed by the end of June 2007. It was reviewed at a Stakeholders' Forum held in Dar es Salaam on September 19th chaired by the Honourable S Wassira, Minister of Agriculture and Lord David Sainsbury. This edition of the report reflects comments and changes agreed at that Forum, in relation to both statistics and institutional arrangements. This report represents the findings of a team comprising of consultants from Golder Associates of South Africa, the University of Manchester in the UK and Oxford Policy Management. The individuals concerned were:

Golder Associates: Bill Berry, John Howcroft, Julian Ward, René Ford

University of Manchester (Materials and Paper Dept): Drs Hugh Gong, Richard Kennon, Neil Towers, Pammi Sinha, Mr. Les Downes and Mr Alan Johnson

Oxford Policy Management: Tim Ruffer

The study was co-directed by Ibrahim Seushi and Laurence Cockcroft on behalf of GCF and TGT. Organisational arrangements were carried out by TGT under the leadership of Mrs Olive Luena. TGT, in cooperation with the Ministry of Trade and Industry, arranged many on-site visits for which the consultancy team is very grateful. The majority of these are listed in an Annex to this report and the team is likewise extremely appreciative of the time and interest shown by the many individuals who participated in interviews and meetings. It was particularly helpful to have two stakeholder meetings with cotton growers, ginnery owners and farmers in both Mwanza and Morogoro and the team is very grateful to the Tanzania Cotton Board and representatives of Regional Governments for arranging and participating in these meetings.

The main report of the study synthesises five technical reports which are presented as Annexes to this report (see Table of Contents). It is intended to comprise a basis for discussion which will lead to an Action Plan for the sector to be further developed through a Stakeholders Forum to be held later in 2007.

Front cover images
Top – supplied by Golder Associates
Bottom – supplied by CAMI, Dar es Salaam

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Abbreviations

ACP	Africa, Caribbean and Pacific
AGOA	Africa Growth and Opportunity Act
CAD	Computer-Aided Design
CDF	Cotton Development Fund
CET	Common External Tariff
CFA	Coopération financière en Afrique centrale
CIF	Cost, insurance and freight
CMT	Cut, make and trim
COMESA	Common Market for East and Southern Africa
CRDB	Cooperative and Rural Development Bank
CTC	Mauritius Clothing and Textile Centre
EAC	East African Community
EBA	Everything But Arms
EC	European Commission
ECGA	Eastern Cotton Growing Area
EO	Extension officer
EPA	Economic Partnership Agreement
EPZ	Export Processing Zone
EPZA	Export Processing Zone Authority
EPZDA	Mauritius Export Processing Zone Development Authority
EU	European Union
FDI	Foreign Direct Investment
FLO	Fairtrade Labelling Organisations
GDP	Gross Domestic Product
GSP	Generalised System of Preferences
ha	Hectare

IARI	Ilonga Agricultural Research Institute
kg	Kilogram
LDC	Least Developed Country
MBP	Millennium Business Park
MFA	Multi Fibre Agreement
MFN	Most Favoured Nation
NDC	National Development Corporation
NIFT	India National Institute of Fashion Technology
OECD	Organisation for Economic Cooperation and Development
p.a.	Per annum
RTA	Regional Trade Agreement
SACU	Southern Africa Customs Union
SADC	Southern Africa Development Community
SEZ	Special Economic Zone
SME	Small and Medium Sized Enterprise
TCB	Tanzania Cotton Board
TIB	Tanzania Investment Bank
TRA	Tanzania Revenue Authority
TSDU	Textile Sector Development Unit
UK	United Kingdom
UKRS	Ukiriguru Cotton Research Station
UNICEF	United Nations Children's Fund
US	United States
USAID	United States Agency for International Development
VAT	Value Added Tax
WCGA	Western Cotton Growing Area
WTO	World Trade Organisation

Executive summary

Background

a) This report examines the current situation within the cotton and textile sector in Tanzania with a view to identifying where the comparative advantage of the sector lies, the policies which would contribute to realising this advantage and the steps which might be taken to achieve it.

b) Whilst cotton production in Tanzania has close to a 100 years the trajectory of production over the last 50 years has been mixed. A set of liberalisation policies introduced in the last 15 years has had significant success in raising aggregate production levels of cotton and re-introducing private sector investment into manufacturing. Some investment in the last five years has been designed to access the US market under AGOA, and current trade arrangements with the EU have also led to an expansion of exports (from a very modest base). Exports within the eastern region of Africa (under SADC and EAC arrangements) have also been modest, though Tanzanian kitenge and kanga cloths are valued in neighbouring countries. The informal sector is important in the context of the domestic clothing market but is limited by the market dominance of the second-hand clothes market, which is highly valued by consumers. The craft market is also limited but some SME suppliers are acquiring a niche in international markets, though the full potential of this is held back by a limited set of design skills.

c) A further increase in seed cotton production is central to the development of the sector, and could be a valuable source of additional income to farmers. Current input supply and marketing arrangements in the sector have been shaped by policies which have placed private sector ginneries in a dominant position, and they have been the key players in creating additional demand amongst farmers. However, current arrangements are not satisfactory in terms of fostering an integrated approach to agricultural production and, in particular, one which fosters a balanced cropping system capable of sustaining soil fertility. Further, the arrangements which have proved successful for farmers in the Western Cotton Growing Area have not been successful in the Eastern Cotton Growing Area, and this constitutes a huge gap in production potential.

d) The textile manufacturing sector currently comprises about 20 enterprises, of which fourteen are sizable employers with a workforce of more than 500. The survey conducted for this report indicated a wide range of quality equipment, labour skills and market focus. However, it is broadly true that: a) spinning, weaving and finishing equipment dates back up to 30 years; b) labour skills are low with a high turnover of employees in many cases; and c) utilisation rates of equipment are often as low as 50%. Companies with a focus on the AGOA and EU markets are an exception to this pattern.

e) Government fiscal policy to the sector is an important factor in its development. At present there are at least five taxes on production which contribute to raising costs to an unnecessarily high level. Companies which import cloth to manufacture garments face differential tariff arrangements of between 10% and 50%. Two public Export Processing Zones exist and there are four stand-alone EPZ producers. However, the EPZ policy has not yet achieved a significant impact. This is partly explained by on-going logistical and clearance problems associated with the port of Dar es Salaam, which have yet to be fully overcome in spite of important progress in recent years.

f) The cotton sector is regulated by the Tanzania Cotton Board (TCB) which has overall responsibility for the sector, including processing, marketing and export. It works closely with

the Tanzania Cotton Association and at the level of manufacturing with the Council of Textile Manufacturers. These bodies are in dialogue with the Government on policy related issues.

Development strategy

g) A strategy to increase overall output has to place cotton in the context of the agricultural system and the need for an approach based on cropping systems, as opposed to a single crop. Conservation agriculture, based on the moisture preserving characteristics of minimum tillage, should be the key to agricultural practices in the area. A route to achieving this would be to develop farming 'hubs' related to the ginneries in which extension services, revised credit arrangements, and multi-crop marketing arrangements would be combined under one umbrella. It is an open question as to whether this would be best carried out by the existing private ginneries or revived co-operative ginneries. In either case, substantial technical assistance will be required. The seed system needs similar strengthening and arrangements are proposed which would involve private sector enterprises in the multiplication of seed bred by the existing research stations at Ukiriguru and Ilosa. Strengthening institutional arrangements along these lines will be crucial in the ECGA where production is now only 3% of the national total. Given this type of support, a reasonable production target would be an increase from 85,000 tonnes of lint cotton in 2005/6 to 160,000 tonnes in 2014/15, based on a tripling of yields and resumption of production in the ECGA.

h) If cotton production can be increased on this basis, Tanzania has the opportunity to develop a much more substantial textile manufacturing sector. Whilst the opportunity exists for a further increase in the export of lint cotton, major markets such as China, India and Vietnam are rapidly expanding their own production of cotton. Whilst the opportunity exists for a further increase in the export of lint cotton, major markets such as China (absorbing 70% of 2006 lint cotton exports) impose a tariff barrier of close to 50%, suggesting that Tanzania's comparative advantage does not lie in lint cotton exports. Whilst opportunities for the export of yarn to south Asia in particular certainly exist, and to some extent are being realised, the most significant opportunity lies in the added value inherent in weaving and some types of garment manufacture. Logistical limitations (primarily time from Dar es Salaam harbour to major EU ports) suggest that the market for cotton fashion goods will not be appropriate given the short runs (three months) characteristic of this market. The recommended solution is therefore in continuity products (e.g. bed sheets, towelling, and undifferentiated clothing products) where longer runs characterise the market and delivery times are not a crucial limitation. For the purpose of this analysis it has been assumed that 90% of yarn production will be absorbed by weaving, knitting and garment manufacture.

i) The development of a strong textile sector with an export profile is closely linked to the development of design skills. The international market is currently very receptive to African based design themes and it will be important to build up skill sets within Tanzania which are initially honed in the craft sector but are eventually deployed in the industrial sector, as has been the case in India (see Annexe D).

j) The development of the sector along these lines will require strong guidance over at least 10 years, particularly because its success will depend on both the attraction of large quantities of FDI (more than US$1 billion) and on the development of both textile engineering and textile design skills. It is proposed that such guidance should be embodied in a Textile Sector Development Unit (TSDU), which could usefully be located in the Tanzania Cotton Board. The TSDU would set out to attract FDI on a very significant scale, ensure that the network of activities required to develop the sector are in place, and take prime responsibility for attracting and channelling support to the development of the skills required. Given the needs for this level of preparation a programme for the sector can usefully be conceived in two stages: a

development phase and an investment phase. Without the former it is unlikely that the latter can be successful.

k) In order to attract FDI on the scale envisaged, it will be necessary to offer matching funds in the form of debt or equity. Such a dedicated fund could be established in a development or retail bank (such as the Tanzania Investment Bank or the CRDB) reflecting a model developed for the floral export industry in the recent past. Whilst the bank would have final responsibility for the allocation of funds it would respond to proposals made by the TSDU and the TCB.

1 Introduction and objectives to the study

This report examines the current situation within the cotton and textile sector in Tanzania with a view to identifying where the comparative advantage of the sector lies, the policies which would contribute to realising this advantage and the steps which might be taken to achieve it.

In Tanzania, cotton contributes to the livelihood of about 40% of the population. Alongside coffee and cashew, it is one of the most important cash crops in the country. In 2005/06, cotton was the largest agricultural export earner. Sustainable cotton farming therefore has the potential to significantly contribute to poverty alleviation as well as socio-economic development in the country. Currently, around 70-80% of cotton production is exported as lint. The remainder is processed by the local textiles industry to produce a variety of products at different stages along the value chain for textiles and garments.

Textiles and garments has a potentially important role to play in Tanzania's development, as has been the case in many developing countries including Mauritius, Lesotho and some of the East Asian countries. The establishment of a garment manufacturing sector does not require massive capital investment by firms or particularly large investments in infrastructure by governments, relative to other sectors such as machinery or chemicals. Further, the fragmentation of production of these sectors in OECD countries and the outsourcing of low-skilled labour activities, such as the making-up of articles of clothing, to low wage locations, offers the opportunity for developing countries to effectively participate in trade.

Given the potential role that cotton, textile and garment industries can make in Tanzania's development, in terms of growth, employment, income and poverty reduction, following discussions between Lord Sainsbury and the President and other senior members of the Cabinet in January 2007, the Gatsby Foundation offered to fund a detailed study of the sector to identify the constraints to its development and provide recommendations that would assist the implementation of the Tanzania Mini-Tiger Plan.

The objectives of the study are as follows:

- To assess the constraints and challenges of the cotton sub–sector; formulate recommendations for addressing the identified limitations in order to: i) increase lint cotton production from 700,000 bales produced in 2005/06 season to 1,500,000 bales (equivalent to 127 and 272 million kilograms respectively); and ii) raise productivity from 750 kg/ha of seed cotton to 1,500 and 2500kg/ha by year 2010 and 2015 respectively. Formulation of an action plan including implementation costs as well as funding options.
- To conduct an audit of the textile industry; perform a diagnostic analysis of the constraints impeding growth of the industry, provide a systematic approach which will ensure that the domestic consumption of cotton consumption is increased from the current 30% to 90% by year 2015. Design an action plan including the costs of implementation as well as funding options.
- To carry out a survey on garments, apparel and other textile products manufacturing; identify critical areas of intervention; recommend the way forward; and draw an action plan including costs of implementation and funding options for the short, medium and long term.
- To design/ formulate a sectoral integration programme which will ensure smooth coordination to facilitate backward and forward linkages in the whole value chain.

This report sets out the findings of this study. The remainder of the report is structured as follows. Section 2 describes the recent performance of the cotton and textiles sectors and describes patterns of production, consumption and trade. It also describes international market access opportunities for Tanzania. Section 3 describes the key constraints to the development of the sector, relating to general government policy as well issues specific to both the cotton and the textiles sub-sectors. Section 4 describes a strategy for the development of the sector. The means of implementing the strategy are described in Sections 5 (policy recommendations) and Section 6 (investment plan and financing sources).

2 Sector performance

2.1 History of the sector

2.1.1 Cotton

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. Following 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. The Cotton Board now performs purely regulatory functions and is funded through the government budget.

In the years immediately after liberalisation, 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.[1] Baffes (2002) reports that during the six seasons prior to the reforms, the average grower's share was 41% of the cotton. This share grew to 51% in the six seasons following the reform. Competition also resulted in prompt payments being made for seed cotton, whereas pre-liberalisation payments had sometimes been delayed for several months.

Table 2.1 Tanzania seed cotton production 1990/91 to 2006/07

Season commencing	Production (tonnes)	Increase	Lint equivalent (tonnes)
1990	149,141		56,674
1991	268,730	80%	102,117
1992	303,984	13%	115,514
1993	145,224	-52%	55,185
1994	123,663	-15%	46,992
1995	245,914	99%	93,447
1996	249,444	1%	94,789
1997	207,754	-17%	78,947
1998	104,891	-50%	39,859
1999	105,000	0%	39,900
2000	123,558	18%	46,952
2001	148,180	20%	56,308
2002	188,453	27%	71,612
2003	139,829	-26%	53,135
2004	341,789	144%	129,880
2005	374,819	10%	142,431
2006	129,000	-66%	49,020

Source: TCB

[1] The number of private buyers increased from 10 during 1994/95 to 54 during 2006/07. Today about 95% of cotton business is controlled by private companies.

However, the sector did not perform well either in terms of maintaining quality control or of assisting producers to access high quality inputs. During the later 1990s, world prices declined, the real exchange rate appreciated and the weaknesses in sector organisation began to make themselves felt. As a result, seed cotton production declined steadily, falling to around 100,000 tones in 1998 and 1999 (see table 2.1). Production has since grown considerably due to a combination of the following factors:

1. Cotton producers in Tanzania are highly responsive to changing (relative) prices of competing crops. 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. Since liberalisation, the absence of additional production incentives in the form of attractive support services means fluctuations in Tanzania have been increasingly heavily influenced by the world price of lint.
2. The introduction of the passbook scheme in 2003 meant that 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.
3. 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, so 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, but it is clear that the degree of inter-year volatility in production remains uncomfortably high.

2.1.2 Textiles

The textile industry in Tanzania evolved to respond to high local 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 industrialisation (supported by international donors), which aimed at producing consumer goods locally and adding value to primary products, including cotton. Combined government and private sector investment in textiles amounted to US$500 million. In the 1970s, there were 22 textile mills in the country, of which 15 were publicly owned. The total installed capacity was over 300 million linear meters.

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 manufacturing sector GDP. The industry absorbed about a third of domestic cotton production (Baffes 2002). The sector was mainly characterised by large-scale fully integrated production systems (including spinning, weaving and printing). Although appearing successful, the textile industry was kept alive only through government protection and subsidies (Government of Tanzania, 1999).

In the mid-1990s, as government protection and subsidies came to an end, the sector was unable to survive international competition, and all but two textile mills went out of business.[2] This led to considerable labour redundancies and idle capacity.

Various explanations for this collapse have been provided. It appears to have been due to a combination of the following factors:

- Inefficiencies in the industry, caused by poor management and outdated technology.
- 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 trade liberalisation.
- Adverse tariff and exchange rate policies which affected the international competitiveness of the industry.
- Severe power interruptions and rising power tariffs.

Around the turn of the century, the government began to sell off the closed mills. They were bought by a variety of investors, both from within the region, but predominantly from India. There are now 20 large scale textile and clothing producers in Tanzania (see Annex A for a list of these producers). Buyers of the mills were faced with the challenge of rehabilitating old equipment, and hiring and training a fresh workforce. Production has resumed over the past five years, although most mills are working below full capacity and continue to rely on the old equipment that was there when the mills were bought.

2.2 Patterns of production, consumption and trade

2.2.1 Cotton

Farmers mainly prepare their lands by hand using hoes, where the surface soil is cut and inverted as a weed control exercise, and to prepare a seedbed. Seeding of cotton is also done by hand using hoes. Fertilisers are rarely used, because of poor access to credit. Weed control is done by hand using hoes. Green ridging, or earthing-up of soil on both side of the cotton rows to form a ridge, is done during weed control. Farmers should weed their fields at least three times in the growing season to achieve a good crop of cotton. In reality, priority is given to looking after the food crop such as cassava, maize, rice or sorghum, with the cotton neglected and planted and thinned late and infrequently weeded. Research at Ukiriguru Agricultural Research Institute (ARI), which serves the Western Cotton Growing Area's (WCGA) cotton farmers, has found that late planting may reduce cotton yields by 68%, and late thinning and weeding may reduce yields by 59%. Soil fertility exhaustion through continuous cropping without addition of fertilisers or manure may lower cotton yields by 75%. Weeds are more of a problem in the Eastern Cotton Growing Area (ECGA) with its higher rainfall. Ilonga ARI, serving cotton growers in the ECGA has found that for ECGA, late weeding and thinning may lower cotton yields by up to 65%.

In an average year, 450,000 hectares are sown to cotton by approximately 350,000 to 500,000 smallholder farmers. The crop is 100% rain fed and the size of farms is small, mainly less than one hectare. Cotton is grown in 13 of Tanzania's 21 regions, with up to

[2] The only mills that continued production were Friendship Textile Mills and Sunflag Tanzania Limited.

99% of the crop grown in the WCGA. However, the ECGA has greater potential for increased cotton production than the WGCA which, due to continued cultivation coupled with inadequate use of fertilisers, has soils which have generally become too exhausted to produce a productive crop.

Following liberalisation in 1993, the contribution of cooperatives in cotton buying has fallen from 100% in the 1980s and early 1990s to 10% in 2001/02 marketing season. However, the regional unions are still the major owners of a large number of ginneries, many being over 30 years old and completely run down.

Tanzania has 77 registered ginners. In 2006/07 33 of these were active. Ginning is increasingly being done by private companies who are investing in modern roller gins. The estimated total capacity of existing ginneries in Tanzania is about one million bales. About 70% of this capacity was utilised in the peak production year of 2005/06, with 694 107 bales of lint produced.

Yields and quality

Table 2.2 gives a comparison of cotton production yields in selected countries. It shows that in 2006/07, lint yields in Tanzania were the lowest in Africa, and around 12% of those achieved in Australia, where yields are the highest in the world. In the WCGA, lower soil fertility is the main factor resulting in reduced yield, whilst insect pests can reduce yields by 40-50% and weed competition in the first 6-8 weeks after crop germination can reduce yields by 45-85%. In the ECGA, soil fertility is higher, but insect pests and weed pressures are generally greater than in the WCGA. Late planting, caused by competition from food crops, is another important cause of poor yields, and often means that the crop is not fully mature when harvested, which results in sub-standard fire quality.

Table 2.2 Cotton yields comparisons in selected countries (kg of lint/ha)

Countries	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Australia	1,842	1,751	1,768	1,782	1,783	1,792
Israel	1,483	1,542	1,744	1,818	1,748	1,757
China	1,107	1,175	954	1,119	1,141	1,147
Turkey	1,330	1,248	1,255	1,289	1,268	1,299
USA	790	746	818	958	867	853
India	308	302	376	439	401	409
Uzbekistan	727	719	641	800	770	722
Egypt	1,031	976	885	950	961	966
Burkina Faso	440	419	441	478	445	447
Mali	451	389	482	435	476	443
Benin	482	455	440	538	467	443
South Africa	412	562	664	717	514	516
Uganda	187	339	296	367	367	368
Zambia	261	265	275	273	276	282
Zimbabwe	221	307	395	224	255	277
Tanzania	161	172	257	212	214	215

Source: ICAC various years, Cotton: Review of the World Situation.

Rampant contamination has seriously impaired the quality of Tanzania's cotton. There is also low awareness about the quality requirements in the cotton production and processing chain as dictated by changing consumer patterns and technological innovations. A weakening of production, harvesting, sorting, grading, and processing practices has meant that contamination is widespread, impacting negatively on fibre quality, as well as lowering the price of both seed cotton and lint. Contamination does not end with the farmer. Other variables include moisture content, length, and temperature of storage. The state of repair of gins, particularly the old cooperative gins, adds to the reduced quality of the lint produced (it should however be noted that the condition of gins in Tanzania is highly variable, ranging from dilapidated to state of the art).

As a result, while previously Tanzanian cotton fetched a premium of about US cents 8/lb for lint sold on international markets, today it is discounted at US cents 6/lb. According to the International Cotton Advisory Committee, Tanzania cotton was rated lowest Africa in terms of quality.

Exports

The value of cotton exports grew steadily from 2000/01 from US$36 million in 2000/01 to over US$100 million in 2005/06. In volume terms, this accounted for between 65% and 74% of domestic production (see table 2.3).

Table 2.3 Exports of cotton lint

Season	Quantity (million kgs)	Value US$ (million)	% production exported
2000/01	31.7	36.4	68%
2001/02	37.2	35.1	66%
2002/03	52.8	45.5	74%
2003/04	34.5	42.2	65%
2004/05	84.0	91.8	65%
2005/06	97.9	100.7	69%

Source: TCB

Table 2.4 shows the main export destinations for Tanzanian cotton. China, Thailand, India and Indonesia are the largest markets, together accounting for nearly 60% of Tanzania's export market in 2004/05.

Table 2.4 Shares of major markets for Tanzanian cotton (%)

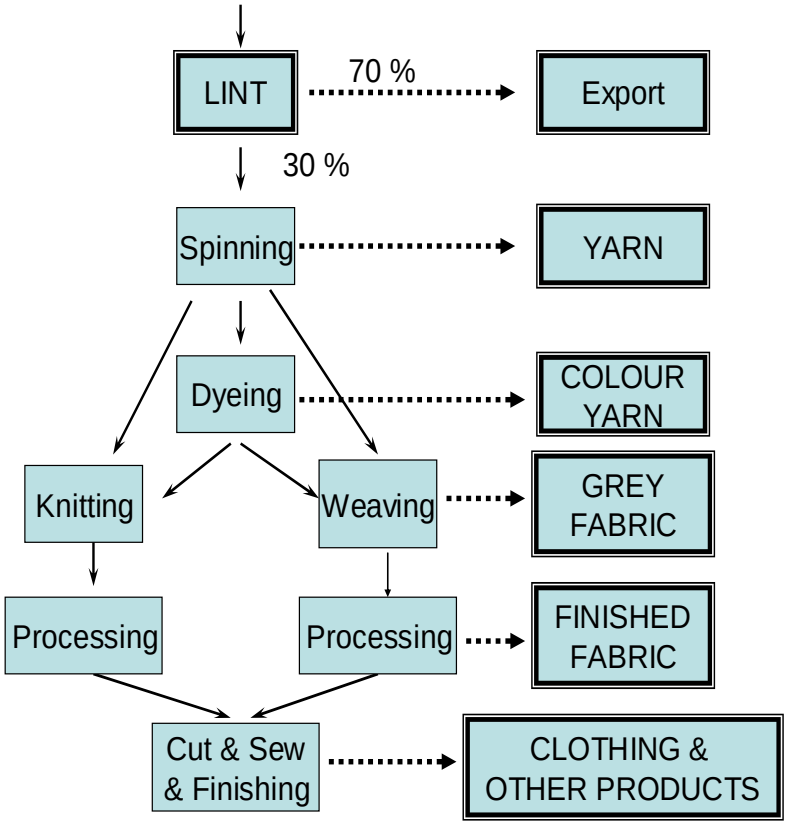
Country	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
China	0.4	7.0	5.4	12.1	12.5	33.1
Thailand	6.5	12.6	14.0	4.4	4.8	10.0
India	18.2	21.4	33.3	14.8	22.4	8.3
Indonesia	15.0	13.1	23.6	21.9	28.0	7.8
Bangladesh	8.7	9.5	2.5	6.9	1.6	7.2
Taiwan	9.5	1.1	1.9	7.2	3.3	4.4
Portugal	5.8	2.0	619	3.3	2.1	1.8
Turkey	3.0	0.6	0.0	0.8	1.0	1.1
Malaysia	9.8	1.7	576	4.5	2.1	0.2
Vietnam	0.0	0.0	1.0	1.3	2.5	-
Others	23.1	31.1	6.6	23.1	19.7	26.1

2.2.2 Textiles and clothing

Sectoral composition

The conversion of cotton lint into textiles and clothing consumer goods is a long and labour intensive process. Several key stages are required (see figure 2.1). Each of these stages produces an intermediate product which is used as raw material for the subsequent stage. These intermediate products can themselves be bought and sold on the international market. Because of this, it is not always necessary or desirable to build vertically-integrated textile production chains, unless the transportation system is particularly problematic.

Figure 2.1 Textile value chain



There are reported to be around 20 textile large scale textiles and clothing operations in Tanzania (see Annex F). The majority of the companies were set up in the 1960s and '70s as fully integrated enterprises, with capabilities to process lint cotton to the final consumer product. The fully integrated approach would have been an obvious solution to start an industry where the infrastructure is poor, but it is a very rigid structure and uncommon in other main textile manufacturing countries where there is usually a mixture of stand-alone companies who provide only one or two processes of the textile chain and some very large fully integrated enterprises. The major processes such as spinning, weaving, knitting, clothing and dyeing/finishing are often considered as separate sectors of the textile industry.

Most of the industry is engaged in the production of printed fabrics for the local and regional market, although there are some which have succeeded in exporting yarn and finished garments further a field, in particular, exploiting preferential market access in the US and EU. The most common products produced are khanga and kitenge fabrics and bed linen, produced for local and regional markets. Due to the high import tariff on these products (currently 50%), these industries tend to be protected from international competition (although they still struggle to compete with more cheaply priced imports from India), and tend to rely on very outdated technologies, produce at low rates of efficiency, and supply low quality fabrics which fall below generally accepted international quality standards.

The more dynamic section of the industry (and the section where growth prospects are more promising) are companies that have recently invested in new production processes to supply international markets (in particular the US and EU to which Tanzania enjoys preferential market access), are owned by multinational companies (African and other), and produce finished garments (in particular t-shirts and shirts). Two companies (A-Z Textile Mills and Sunflag) also successfully produce mosquito nets for the regional market and are the suppliers of international aid agencies, including the Global Fund, UNICEF, and USAID.

The low quality of the finished materials currently available from most of the weaving facilities in Tanzania means that garment producers for the international market rely on imported fabric. However, some (e.g. A-Z Textile Mills) are investing in modern spinning and knitting plants. At present, only the local market appears to be prepared to accept the poor quality fabrics generally produced in Tanzania.

Production capacity and quality

1. ***Spinning:*** The quality of lint cotton emerging from the supply chain is very important as this impacts on the yarn quality. The technology in this sector is generally over 30 years old. The running speed is about 50% of what can be achieved with modern ring spinning technology and current operating capacity is below 50%. This is due to outdated technology, lack of spare parts, low labour efficiency and, in some cases, low demand within the fully integrated operations. Cleanliness, air conditioning facilities and buildings are generally of a low standard. This restricts the production level and quality of the output. As a result, the quality of the yarns produced is mostly far below international standards, and is only acceptable for products aimed at the domestic market.

   Almost all of the spinning factories are cotton-based with only one exception where some cotton/polyester blends are produced. At current production efficiency and yarn count, the total installed spindles could process 22,500 tonnes of lint cotton per year when fully utilised, although current production is estimated at around 10,000 tonnes. With the exception of New Tabora Textile Mills, all of the spinning factories are within fully integrated companies and the cotton yarns are completely used within the same company for fabric production.

2. ***Weaving:*** The majority of the production machinery currently in use is based on old shuttle-loom technology producing 100% plain-weave cotton fabric. Such equipment (even if it is very old) is perfectly capable of producing high quality material, providing that it is correctly adjusted and well-maintained. Unfortunately, most plants have not been well maintained, automatic weft-replenishment systems are not functioning and weft packages have to be changed by hand. The looms are producing low grade fabric, the manufacturing problems being exacerbated by the fact that the spun yarn

is of poor quality which inevitably means that the looms have to be run slowly and suffer from an increased level of stoppages due to yarn breakage.

Older Picanol shuttle looms, despite their high quality, have to be taken out of service due to the fact that the weaving technicians are unable to repair them owing to a lack of spare parts for the weft replenishment system. Indeed large numbers of Picanol looms are being dismantled to provide spare parts for those machines still in service.

3. ***Processing:*** The majority of the processing is based around locally consumed imitation wax products, Khanga and Kitenge styles, which are cotton-based products. The general standard of these products is poor by European standards but perfectly acceptable for the local market.

   Equipment is old, poorly maintained, and unsuitable to compete in the global market. In many cases the operating width of the equipment is below the minimum requirement for garment production. No continuous dyeing facility was seen and there is no processing capability for an export bed sheet market.

4. ***Clothing manufacture:*** The garment-manufacturing stage, the final phase of the fibre development chain, does not necessarily have to start with fabric from any particular mill and indeed this is not usually the case. The low quality of the finished fabrics currently available from most of the weaving facilities in Tanzania completely precludes their use in cut and sew garment manufacture. Only the local market appears to be prepared to accept such poor quality fabrics, but at a very low price, further depressed by the massive second hand clothes market.

All the large-scale garment-making plants offer good working conditions and are populated with a wide range of modern machinery. The established factories which make up fabric knitted within their firm are working close to capacity.

One factory is exporting 4,500,000 leisure wear garments per year to the UK and US, showing that the industry in Tanzania has the capability to produce high-quality goods suitable for the export market. Some companies have a very strong market position in the manufacture of mosquito net fabric based on polyester yarn. This is an expanding area. For other products, maintaining an acceptable standard for export is seen as a serious challenge.

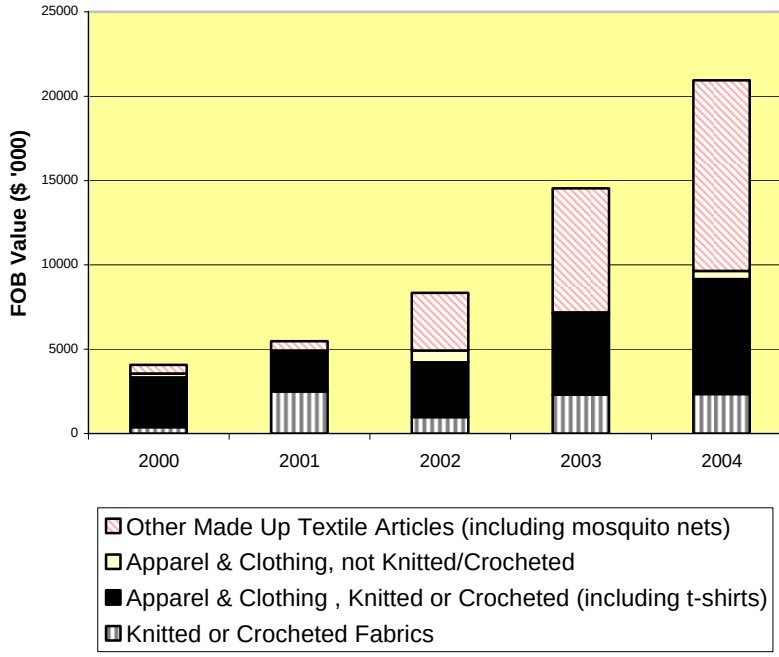
Employment

Kabelwa & Kweka (2006) estimate employment in the textiles and apparel industry at 68,000 (13% of manufacturing employment), based on a 2004 Economic Survey. This is of a similar magnitude to the estimate from the 2000/01 Integrated Labour Force Survey, which put the number at 78,000 in 2000/01. Total employment in the large scale textiles operations listed in Annex F is estimated at around 15,000, which suggests that the majority of employment in the industry (around 80%) is in the small scale and informal sector.

Exports

As shown in Figure 2.2, the export of textiles products has grown rapidly in value terms since 2000, from just over US$4 million in 2000 to nearly US$21 million in 2004 (more than a five-fold increase over four years). The greatest increases have been for knitted and crocheted fabrics and clothing exported to the US and EU markets, and of mosquito nets exported within the region.

Figure 2.2 Composition of Textiles exports 2000-04

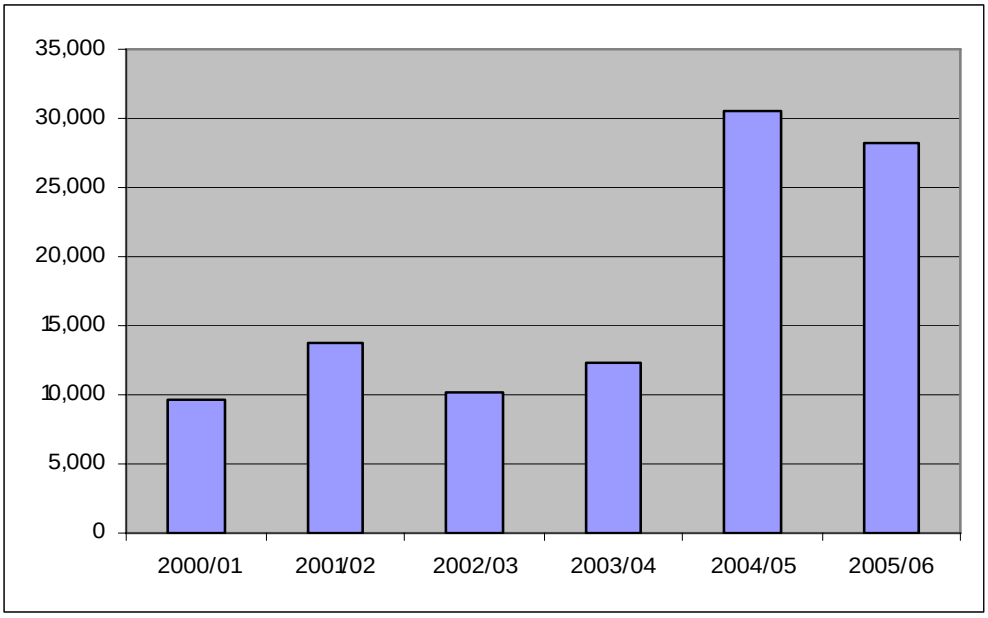


Domestic consumption

There are various estimates of the domestic market for textiles and garments. One industry estimate suggests that 60% of the female population uses Khanga and Kitenge. This implies that there are 10 million consumers, assuming that each consumes 30 metres per year; there is a potential domestic market of 300 million metres. Current production is estimated at 200-240 million metres (of which some is exported). The shortfall is made up by imports. This means there is scope for increased production for domestic market. Because many factories are operating below potential capacity, this could probably be done with existing capital. This implies that the domestic market for khanga and kitenge is not sufficient to drive a significant expansion of the industry (in line with the targets set out in section 4).

Figure 2.3 shows the proportions of cotton lint exported and consumed domestically. It shows a rapid increase in domestic processing during between 2004/05 and 2005/06.

Figure 2.3 Production and export of cotton lint



Source: Calculated as the difference between domestic production of lint and lint exports.

Second-hand garments

Second-hand clothing is primarily imported from the US, Canada, and Europe. It is sourced by exporters from the unsold goods of new merchandise retailers, charity donations from large clothing chains, and a mixed variety of other outlets including consignment shops, vintage and thrift stores, garage sales, car-boot sales, jumble sales and charity shops, and flea markets.

Second-hand clothing is a multimillion-dollar global trade. Trade has increased ten-fold since 1990 to reach an annual value of US$1 billion (Baden & Barber 2005). Supporters of the industry point out that the trade creates employment in the receiving countries and provides low-cost clothing for people in poverty. At the same time, however, there are concerns that the trade may be undermining local textiles and garment industries. In sub Saharan Africa, second-hand clothing accounts for 27% of all clothing imports by value (and a considerably higher proportion by volume) (2003 figures). In Tanzania, this proportion is around 65%, which suggests that second-hand clothes account for well over 90% of imported clothing.

Table 2.5 Imports of second hand garments

Year	2003	2004	2005	2006
CIF Value (Tsh million)	31,036	34,094	29,327	34,350
Weight (million kg)	50.9	56.1	47.8	45.3

Source: Tanzania Revenue Authority

Second-hand clothing is widely accepted by the consumer market in Tanzania. The clothing is very popular not only because the prices are low, but because the quality is particularly high and the garments are long-lasting in comparison with most locally produced newly manufactured garments. The style of second-hand clothing is generally preferred by the fashion-conscious youth of Tanzania. Second-hand clothing also has the

benefit of being exclusive: because of the disparate sources from which the clothing is collected, it is rare for there to be two similar items for sale in the market.

As a result, it is difficult to envisage that serious inroads can be made into the local outerwear market owing to the domination of second hand clothing sales and the retailing of inexpensive, generally poor grade, khanga and kitenge items. The firms that do sell casual wear locally (A to Z and Sun Flag) concentrate on the production of garments from knitted fabric in the form of promotional t-shirts and polo shirts with printed or embroidered logos – i.e. products that are not sold directly to the consumer.

2.3 International market access and prospects[3]

2.3.1 Regional market access

The two most important regional trade agreements (RTAs) for Tanzania take place under the East African Community (EAC) and the Southern Africa Development Community (SADC).

The EAC Common External Tariff (CET), has three bands (0, 10%, and 25%), although rates above 25% apply to a number of "sensitive" products. Relevant to this study, sensitive products include Khanga, Kikoi and Kitenge fabrics, second-hand clothing, cotton bed linen and cotton label linen, for which tariffs are around 50%, thus providing heavy protection to the domestic industry.

Differences in labour intensity at various stages in the textile and garment value chain in SADC mean that there are potentially significant complementarities among SADC member states which, through SADC trade initiatives, might enhance the region's competitiveness in world markets. It is a sector in which some of the member states, most importantly Mauritius, have already demonstrated the potential of the sector to promote growth and poverty reduction through international exports. And the opportunities opened up through AGOA make this a crucial time for remedying domestic and regional policy weaknesses that have hindered the region's international competitiveness. However at present, with a few exceptions and except for yarn, SADC rules of origin require double transformation in order to qualify for SADC tariff preferences – garments must be made from regionally produced textiles; fabric must be made from regionally produced yarns; yarn must be made from uncarded, uncombed fibre or from chemical products. These rules hinder regional specialisation in the value chain.

2.3.2 International market access

Although most of Tanzania's current exports face no customs duties, Tanzanian exporters face important tariff barriers for cotton and for textiles. For example, in addition to levying an import duty of 47% on cotton, China also shields its domestic growers with subsidies and other measures totalling US$1.2 billion in 2002, second to the US with US$3.6 billion, and above the EU (US$1.1 billion) and India (US$500 million).[4] Despite these barriers,

[3] This section summarises a more detailed examination of international market access and prospects for cotton and textiles in Annex E.

[4] See John Baffes, "Cotton: Market Setting, Trade Policies, and Issues," in Global Agricultural Trade and Developing Countries edited by M. Ataman Aksoy and John C. Beghin (Washington: The World Bank, 2005), pp. 259-273.

Tanzania still exports considerable quantities of cotton to China – in 2004/05, it was Tanzania's most important export market. At 10%, India's tariff on cotton is far lower than China's. However, India is increasingly becoming a cotton exporter, meaning that market opportunities for Tanzania may be declining.

Tanzania's textiles and clothing exports also face high tariff barriers to various markets. These barriers are most pronounced for exports to India. Even where preferences are available and Tanzania currently exports the product, traders do not necessarily receive tariff preferences on every shipment (e.g. for t-shirts in the US).

The limited use of trade preferences is often caused by burdensome rules of origin. In addition, preferences may be considered uncertain because they can be revoked or modified unilaterally. Uncertainty is increased by the inclusion of various non-trade (political, labour, social, and environmental) concerns as conditions for accessing all or certain aspects of the available preferences. Furthermore, even without these constraints, liberalisation of preferential markets (including through the increasing number of regional trade agreements) continues to erode existing preferences.

Tanzania enjoys preferential market access to the EU under the 'Everything But Arms' agreement (EBA) under which duty and quota-free access is provided for products originating in the LDCs. However, exports to the EU under EBA are subject to rules of origin. While products wholly obtained in the exporting country are considered as originating there, products manufactured with inputs from other countries are considered so only if they have undergone sufficient working or processing. These rules of origin particularly negate the generosity of the EU preferences provided for textiles and clothing. The preference utilisation rate for developing countries exporting these products to the EU is just 31% (Brenton & Manchin, 2002). This is because EU rules of origin in the clothing sector stipulate a double step processing requirement whereby clothing products must be made from domestically produced fabrics or fabric from EU countries. Clothing produced from fabric imported from third countries will not satisfy the EU rules of origin and will not receive preferential treatment. This is therefore one of the main ways in which the Economic Partnership Agreements (EPAs) currently being negotiated with the EU could result in an improvement in Tanzania's access to EU markets.

Non-preferential tariffs for exports to the US for fabric and garments range between 20 and 30%, meaning that the ability of exporters to benefit from preferences has a large impact on the prices they receive. Tanzania qualified for the African Growth and Opportunity Act (AGOA) in February 2002 and became eligible for the preferences under the apparel provisions in July 2004. The typical US MFN import duties on garments currently exported from the SADC region are in the range of 17-20%, so these provide significant preferential access. As a 'Lesser Developed Country' under AGOA classifications, Tanzania is able to utilise non-qualifying third country input materials for eligible apparel exports, which is a considerably more relaxed rule of origin currently than those provided by the EU under EBA. This is probably the main explanation for why the US is a more important export market than the EU for Tanzanian apparel exporters. This provision is currently in place until 2012.

2.3.3 The global cotton market

Tanzania accounts for around 0.5% of world cotton production and 6-7% of African production. One third of cotton production is traded internationally. Cotton is subject to numerous marketing and trade interventions. For eight countries (United States, China,

European Union, Turkey, Brazil, Mexico, and Egypt), direct production assistance in the five seasons between 1997/98 and 2001/02 ranged from US$3.8 to US$5.3 billion.

Studies predict that a removal of support subsidies would result in an increase in the world price of cotton of 11-28%. These studies suggest that cotton export earnings could increase for all developing countries by US$610 million to US$3,250 million. West and Central African countries could gain between US$94 million and US$360 million in cotton production earnings (from an initial level of US$963 million) (FAO undated).

In the ongoing "Doha Round" of WTO negotiations, four West African states[5] have succeeded in bringing the issue of cotton subsidies and their affects as a special case in the Doha Round of WTO negotiations. As a result of the case that they have made, which has been supported by Tanzania, it was agreed at the Hong Kong WTO Ministerial meeting (December 2005) that as part of the agreement during the Round, there would be considerable reductions in the levels of distortion in international cotton markets. However, the nature of WTO negotiations is that "nothing is agreed until everything is agreed", meaning that this agreement is meaningless until the WTO negotiations are completed.

Two factors are expected to influence future world demand for cotton:

- **The share of synthetics in total fibre consumption.** From more than 80% in 1950, cotton's share in total fibre consumption fell to 50% by 1980 and to 42% by the end of the 1990s. A few industrial countries have tried to increase cotton's share in fibre consumption through promotional activities. Results have been favourable, but developing countries have not engaged in similar activities. Even without such efforts, however, cotton's share could increase because of consumers' growing preference for natural over synthetic products.
- **World income growth.** On the income growth side, the picture is more optimistic. With annual world income expected to grow 2.9% from 2008-2030 (World Bank 2007) and an estimated income elasticity of 0.6 (Baffes, 2002), cotton consumption could grow by as much as 1.7% per year, implying a 40% increase in demand over the next 20 years.

Additionally, there is a strong likelihood that increasing pressure on labour costs in major cotton farming and textile manufacturing countries such as China could increase the competitiveness of Tanzanian producers.

2.3.4 Niche cotton markets

A Fairtrade standard for seed cotton production was adopted by Fairtrade Labelling Organisations International (FLO) in 2004. It is applicable to smallholder cotton producer organisations only and only applies to the process of producing raw cotton, not the subsequent processing of cotton in the production of a finished textiles or clothing product. As of November 2005, 50 cotton producer organisations from India, Mali, Peru, Senegal and Cameroon had been certified under the standard. Fairtrade certified cotton products have been launched in the UK, France, Switzerland and Belgium.

Seeking Fairtrade certification may be a promising option for some Tanzanian cotton farmers, particularly those already organised into producer groups. Prices offered for Fairtrade cotton appear to compare very favourably with those received for standard cotton

[5] Mali, Burkina Faso, Benin and Chad.

in Tanzania. Cotton farmers currently receive in the region of US$0.27 per kilogram for standard cotton, meaning that Fairtrade cotton could provide a 100% mark-up for farmers over cotton sold for conventional markets.

Growing organic cotton affords premium prices. Organic cotton farmers generally receive 20% higher prices than their conventional counterparts. Most organic cotton grown in sub-Saharan Africa is project-based and donor supported. Case studies from several African countries (including Tanzania) suggest that organic cotton has much to offer smallholder farmers in the region. Experience shows that it is technically feasible, reduces health problems, maintains soil fertility and food security and often supports higher incomes than conventional cotton.

Although Tanzania seems well suited to the production of organic cotton, because of the low reliance on chemicals and fertilizer, inspection and certification are still at an early stage. In experimental trials farmers readily accepted and produced organic cotton, but the marketing side of the experiment was less successful. However, this does appear to be an area where further consideration would be warranted.

3 Constraints and challenges

3.1 Government policy

3.1.1 Taxation

The 2004 Investment Climate Assessment for Tanzania (World Bank 2004) found that tax rates were more likely to be considered a serious problem by Tanzanian enterprises than any other constraint, with 73% of enterprises rating them as a major or very severe obstacle. More enterprises rated tax rates as a serious problem in Tanzania than in any of the other countries where Investment Climate Assessments had been completed by the end of 2003 (except Ethiopia and Brazil).

Despite complaints about tax rates, corporate income tax rates (30%) are similar to rates in other developing countries, although, at 20%, value-added tax (VAT) rates are somewhat higher than in the comparator countries. The new income tax act passed in July 2004 means that income tax law is generally in line with international best practice. Withholding tax is also standardised in the region. However, the overall burden of payroll taxation is relatively high because the tax free allowance is set low (less than half the level in Kenya) and there is an additional 6% skills and development levy and compulsory uncapped payments of 20% to a social security scheme (of which 10% must be paid by the employer and 10% by the employee).

Taxes and levies on cotton production have been simplified in recent years and the overall burden of taxation has been reduced. A number of taxes and levies are paid along the cotton value-chain (see table 3.1). This begins with the farmer who pays TSh 20/kg seed cotton to the Cotton Development Fund, of which TSh 15/kg is returned to farmers in kind in the form of inputs. The Cotton Development Fund also receives revenue from the gins (TSh 5/kg). In addition, farmers pay a district tax. In most cases, the Education Fund Levy has been removed, although it remains in place in a few exception circumstances.

Table 3.1 Taxes and levies on cotton production

Tax / Levy	Amount	Levied on	Payment made by
Cotton Development Fund	TSh 20.00/kg[1]	Seed Cotton	Farmer
	TSh 5.00/kg	Seed Cotton	Gin
	Up to 5%	Seed Cotton Price	Farmer
VAT	20%	Oil/Seedcake/Husks	Mills

Notes:

a. TSh 15.00/kg of this represents a payment in advance for inputs by farmers, which is returned to them in kind.

Overall, the burden of taxation on lint has been reduced considerably since 1998/99, when a government study of the tax structure in (Government of Tanzania 1999) found that the tax burden on cotton was more than 13% of the producer price (7.7% for district taxes and 5.1% for central taxes).

3.1.2 Tariff policy

The EAC's tariff structure is set out in table E.1 in Annex E. Tariffs for cotton textiles products are 10% for yarn, 25% for most other textiles products, and 50% for khanga, kitenge, kikoi, and bed and table linen. The World Bank (2005) shows that the average nominal tariff for textile and textiles products is 20%, whilst the effective rate of protection[6] is a massive 155% (the most protected sector in Tanzania). This study also shows that because of this protection, several firms in the sector are value-sub-tractors, meaning the value of their tradable production inputs at international prices exceeds the trade value of their final products. This is because import tariffs distort the domestic price structure which results in the local retail price of some textiles products being considerably higher than international prices, meaning that these companies were not necessarily loss-making and could, hence, continue to operate, although they clearly represent a waste of resources for the economy overall. There is a danger that this structure of protection supports the survival of firms that are internationally uncompetitive and that generate little income to pay wages and income taxes, while imposing significant costs on the economy through high output prices. This is illustrated by the fact that domestically manufactured woven fabric costs approximately US$4.00 per metre, whereas imported twill costs US$1.25 and imported denim costs US$1.65.

Economic theory tells us that imposing such heavy distortions on the economy incentivises enterprises and investors to allocate resources in production for the domestic market, leading to a lack of incentive for investment, innovation and improving efficiency. Our analysis of the textile industry tends to support this theory where we see a traditional section of the industry that produces low quality fabric for khanga, kitenge and bed linen using outdated technologies. The most significant investments are taking place in export-oriented sectors, despite the anti-export bias that the current trade regime has. This appears to be the more dynamic sector, where technologies are most modern, and where wages and working conditions (and hence productivity of workers) are best.

High tariffs on some intermediate inputs for some textiles producers who are not export oriented (e.g. the 25% tariff on imports of woven fabric) encourage investments in integrated textile mills (spinning, weaving, processing in one roof) which is a huge capital investment with a low rate of return. The tariff structure discourages investment in single units (e.g. garment manufacturing), which often require lower capital investments for a higher rate of return.

3.1.3 Export Processing Zones and Special Economic Zones

EPZs have played an important role in many countries in the development of a modern and competitive export-oriented textiles sector. Incentives and facilities provided through EPZ schemes have the potential to offset many of the disadvantages facing the oriented textile

[6] The effective rate of protection takes into account protection on both outputs and inputs, and provides a better representation of protection to domestic industries than nominal rates of protection which are based on protection of outputs only.

sector operating elsewhere in Tanzania discussed in this section.[7]

There are currently 12 EPZ operators in the country, of which there are four stand-alone EPZ textiles producers (NIDA, A to Z Textile Mills, Tanzania China Friendship Textile and Kibotrade)[8] and two textiles producers located in one of the two EPZ industrial parks in Dar Es Salaam, the Millennium Business Park (CAMI and Africa Pride).

The Export Processing Zones Act 2002 (as amended in 2006) provides for the following tax incentives for enterprises licensed to carry out business in an EPZ and exporting at least 80% of production:

- A 10 year tax holiday on income tax and withholding tax (dividends, interest and rent).
- No customs duty, VAT or other tax on raw materials and capital goods related to production in the EPZ, subject to exclusion for motor vehicles, spare parts and consumables; no VAT on utility and wharfage charges.
- No local authority taxes for 10 years on products produced in the EPZ.
- No stamp duty.

In addition there is exemption from the pre-shipment or destination inspection requirement, and entitlement to on-site customs inspection. Industries selected to benefit from the programme, although not specifically stated in the EPZ Act or its regulations, are: agri-processing; textiles and garments; fish processing; leather goods; lapidary; wood products; electrical appliances and electronics; and information and communication technology.

The government has targeted eight regions of the country for EPZ activities, selected based on a 'gateway' approach whereby they are in close proximity to airports, ports or dry ports, and border areas to promote trade, or within areas where industrial growth is projected in the future. The targeted regions are Dar es Salaam, Mtwara, Tanga, Mwanza, Arusha, Kilimanjaro, Kigoma, Manyara, and Kibaha. These locations are only guidelines for investors, however, as all areas of the country are open to EPZ investment.

[7] In particular, the anti-export bias created by the EAC tariff regime and the problems associated with transport infrastructure and logistics and access to reliable power and water.

[8] Although Tanzania China Friendship Textile has EPZ status, it is not currently taking advantage of this status because it predominantly supplies for the domestic market. Kibotrade is a recently established business in Tanzania and has not yet begun production. Production is due to commence in August 2007.

Box 3.1 Millennium Business Park

Millennium Business Park is the first large-scale EPZ to be developed in Tanzania. It is a 20 hectare fenced industrial park situated in the Dar es Salaam suburb of Ubungo. It is located along Morogoro Road, the main access route linking the EPZ to the Port of Dar es Salaam, the International Airport, Tazara Railway Station and Tanzania's hinterland. MBP was developed by Contitrade, which is a foreign-owned company headquartered in the United Kingdom, 80% financed by Contitrade and 20% by the East African Development Bank. MBP was given a 'light industrial land use designation' by the NDC which permits it to function as a manufacturing, production and warehousing facility. The development has 40,000 square metres of factory/warehouse space, 5000 square meters of showroom facilities, and 10 residential units to house onsite management staff. The pre-built facilities were designed to be easily sub-divided. The warehouse units were designed with loading bays and wide-turning radiuses to accommodate truck movements in and out of the site.

MBP was under construction when NDC approached the owners to convert the site into an EPZ facility. After lengthy negotiations, Contitrade agreed to obtain EPZ status for the complex with the intent that NDC, in time, would purchase and operate the facility themselves, making this a build, own, operate, and transfer (BOOT) transaction. To date, financial discussions between the NDC and Contitrade have not been finalised, and Contitrade remains the owners and operators of the business park.

Space earmarked for EPZs, for example in the Millennium Business Park, is currently undersubscribed. Despite the fiscal incentives provided to investors, under-subscription appears to be due to several factors listed below.

1. **Infrastructure.** Although the EPZ law puts the responsibility for infrastructure provision in EPZs in the hands of government, this is does not appear to be the case in most cases. EPZ operators complain that access to power is unreliable and that they receive no special treatment from Tanesco.

   Access to water is another serious issue for EPZ operators. Although MBP was constructed with modern water connections to Dar es Salaam's water network, EPZ operators in MBP must purchase water from a private source to operate their businesses, which is expensive and inconvenient for water-intense industries. At Nida, water for production purposes is obtained from bore holes and is cleaned through an on-site water treatment plant, which is also an expensive endeavour.

   Although EPZ operators complain about the costs of water and power, they are competitive with other countries (see section 3.1.5). The high costs are more related to problems of reliability, meaning that enterprises are forced to source alternative (and expensive) water and power supplies.

2. **Customs clearance.** None of the EPZs have an on-site Customs Office. According to the EPZ Act, a Custom's facility must be located within an EPZ facility. Although the Millennium Business Park has constructed a Custom's booth on the premises, it is not operational. EPZ operators must call the Tanzania Revenue Authority (TRA) a day before a shipment is either to enter or exit the EPZ facility to request a custom's officer to document and verify shipments. This often leads to delays. Further, we understand that delays are often experienced by EPZ operators in getting through goods through the ports and that the streamlined procedures set out in the EPZ Custom's regulations are not always adhered to. For example, CAMI's first batch of imports was delayed at the airport for over 30 days.

Box 3.2 The Clothing and Textile Centre in Mauritius

Due to the specificity of the textile and garments sector and the increasing demands by operators, an individual arm of the Export Processing Zone Development Authority (EPZDA) has been set up. This is called the Clothing and Textile Centre. It is more geared towards the technological aspects of the industry and has the following strategy:

- To make "Made in Mauritius" an established label.
- To prepare the Mauritian Textile and Clothing Industry to face up to new challenges.
- To assist towards the development of an integrated fashion industry.
- To maintain a regular in plant presence and be a source of constant support through the user
- scheme.
- To carry out Productivity and Quality Improvement Programmes in the non-textile sectors, while
- taking on board green productivity.
- To provide information in the most timely and cost-effective manner.
- To strengthen existing and establish new international links to facilitate the acquisition of
- technology and technical know-how.
- To develop ways and means to increase financial autonomy over time with due consideration to National Development Objectives.

The objectives of the CTC are:

- To assist the textile & apparel industry to enhance its value-addition throughout the value chain.
- To promote and enhance improvement in clothing manufacturing technology.
- To assist industry in building up the design and creative content of products.
- To assist in the development of human resource potential for the industry.
- To be a source of information on all matters related to industry.
- To carry out R&D.
- To carry out commissioned studies.

Source: RATES (2005)

3. **High rental rates.** Leasing rates charged by the two private EPZs are high, especially considering the lack of adequate utilities and infrastructure. Compared with Kenya's flagship EPZ facility, the Athi River EPZ, a public sector investment operated by Kenya's Export Processing Authority, leasing rates by MBP are high yet the array of amenities offered is much smaller (World Bank 2004) (Table 3.2).

Table 3.2 Rental/Lease Rates of Tanzania/Kenya EPZ Facilities

Property Rentals and Lease Terms	**Millennium Park Tanzania**	**Athi River EPZ Kenya**
Serviced Plots	No land plots available (pre-built facilities only)	US$5,000/year (30 year lease)
Service Charges	Not applicable	10% for common services
Industrial Buildings	US$3.00/m2/month (rent)	US$2.8/sq.ft/year (6-year lease)
Service Charge for common service areas	10%	15%

Source: World Bank (2004)

4. **Marketing.** Tanzania's EPZs are not well known. The EPZA has funds set aside for the 2007/08 financial year for marketing locally and internationally. Tanzania has a number of physical and economic attributes that make it competitive in the global market. These competitive advantages need to be packaged and marketed for the EPZ programme to help attract new investment to Tanzania. Based on this, a marketing strategy should be developed to "brand" Tanzania's EPZ program.

   There are currently no publicly owned EPZ facilities in the country, which in part explains these drawbacks. However, the EPZ Authority is planning to develop 13 public EPZs. The first would be in Bagamoyo (60 km north of Dar es Salaam), where 3,000 hectares has already been identified for the site. Plans for development are at an early stage and the facilities will not be in place for some time (perhaps five years at a minimum).

   The Special Economic Zones Act (2006) provides for SEZs to be established in "selected geographical areas". The activities to be considered will be ones that accelerate domestic production, promote exports or generate employment. The sectors in focus are: agricultural, agro-industrial, industrial, tourism, commercial, forestry, information and communication technology, banking and financial centres and other sectors as may be determined by the SEZ Authority. To be licensed to operate within an SEZ new investments will require a minimum capital of US$5 million for foreign owned investments or the equivalent of $1 million in case of locally owned investments.

   Investment incentives are categorised into three groups of investors as follows:

   - Incentives for developers of infrastructure;
   - Incentives for investors selling within the customs territory; and
   - Incentives for investors selling in export markets.

   The incentives for SEZ investors selling in export markets (and exporting at least 80% of production) mirror the incentives for EPZs.

3.1.4 Business environment

In 2006, the World Bank's 'Doing Business' database (www.doingbusiness.org) Tanzania was rated Tanzania at 142 for the ease of doing business – a low ranking, but an improvement over the rank of 150 scored in 2005. Improvements were particularly marked in relation to "protecting investors" and "trading across borders" (see table 3.3). Ongoing efforts by the government to improve the business environment are important to the industry.

Table 3.3 Ease of doing business: world rankings for Tanzania

Ease of...	2006 rank	2005 rank	Change in rank
Doing Business	**142**	**150**	**+8**
Starting a Business	127	124	-3
Dealing with Licenses	172	172	0
Employing Workers	143	145	+2
Registering Property	157	161	+4
Getting Credit	117	117	0
Protecting Investors	99	141	+42
Paying Taxes	113	108	-5
Trading Across Borders	67	104	+37
Enforcing Contracts	65	63	-2
Closing a Business	105	95	-10

Source: www.doingbusiness.org

3.1.5 Supply chain management and infrastructure

Transport

The cotton growing areas have good main roads. However secondary roads are showing a need for maintenance and tertiary roads are very poor. This impacts on moving seed cotton from the buying posts to the ginneries.

A textile supply chain is unique in the extended number of processes involved in the whole supply of raw material to the final customer (the consumer). Effective production planning that is coordinated between each component of the supply line will vastly improve the quality of timing and decision making by management involved in planning process

The internal distribution system (i.e. the road network), the trucking delivery performance, the port performance and the speed of customs clearance, and the frequency and reliability of shipping to the destination country are all important factors which determine the international competitiveness of a country's textiles and clothing sector. Those producing clothing for international clients have tight schedules which must be kept to. Late delivery at the country of destination commonly renders a consignment totally worthless.

Containerisation and port facilities also play an important role in determining the effectiveness of the export supply logistics for Tanzanian cotton and textile products. Similarly, imported cotton cloth used for conversion into textile final products is dependant on an efficient and effective importation process. However, most of the procedures and documents necessary to move product in and out of the country are manually based, requiring a personal visit to the Customs offices. They seem fraught with error and delay: Interviews conducted as part of this study suggested that in clearing containers at Dar es Salaam port, 20% of clearance typically occurs in seven days and 80% occurs in 21 days. Delays at the port appear to be most pronounced for imports, meaning that factories reliant on imported inputs carry large stocks to buffer against the unpredictability of supply from the importation process.

Shipping costs appear to be similar from Dar es Salaam as for other major ports in Sub-Saharan Africa and the port is well placed in the global sea freight system.

Power

Despite reforms, in a recent business climate survey (World Bank 2004), about 59% of enterprises rated the power sector as a serious problem, more than in Kenya, Uganda, or China. Concern about power was particularly widespread among larger enterprises. The cost of power does not seem to be excessively high in Tanzania. The average price per kilowatt hour (US$0.08) is no higher in Tanzania than in most comparator countries. However, reliability is a serious problem. In the 2004 survey, the median enterprise in Tanzania reported losing 5% of production due to outages and surges. This was considerably higher than the median estimates for China (0%), Uganda (0%), and Kenya (3%). In 2002, the median enterprise in Tanzania suffered power outages on 48 days, compared to 21 days in Kenya and 20 in Uganda.

Enterprises can reduce their vulnerability to outages by operating their own generators. But generators are expensive to buy and use. Among enterprises with generators, the median firm taking part in the survey paid Tsh 14 million for the generator. Enterprises in Tanzania are more likely to have their own generators (55% of enterprises) than enterprises in China (27%) and Uganda (35%), but less likely to have generators than enterprises in Kenya and India (70 and 71% respectively).

Annex D, discusses the supply chain management challenges in the textiles and clothing sector. It highlights several criteria which must be satisfied if a country is to successfully export fashion garments. One of the most important criteria is reliability and cost of supply to the destination retailer. For most fashion ranges, there is a 7-8 week selling season repeated throughout the year, meaning reliable and repeatable deliveries are a prerequisite.

Overall, the effective operation of the supply chain is severely impeded by infrastructure:

- A poor rural roads and communications infrastructure in the main cotton producing areas makes it difficult to distribute inputs and enable timely access the crop.
- An ailing railways network which breaks down frequently necessitates the haulage of cotton over long distances in lorries and trucks.
- The poor state of the roads and railway system, as well as unpredictable delays in passage through Dar es Salaam port, both for imported inputs and the exported final product, make scheduling of orders and delivery of goods highly unreliable, resulting in delays and non-fulfilment of contracts by textiles and clothing manufacturers.
- Unreliable water and electricity supplies mean that manufacturers are forced to invest in expensive generation equipment and purchase water through alternative sources.

3.2 Cotton

Summary of constraints and possible solutions

Table 3.4 summarises the constraints faced by farmers and possible solutions.

Table 3.4 Summary of constraints faced by farmers

Constraint	Possible solution
Lack of access to credit	Access to credit through lending and saving in village banks
Soil erosion	Conservation agriculture
Soil fertility decline	Fertilisers, manures, "green manure" crops
Labour shortages for weeding	Herbicides, smother crops
Extension	Farmer Field Schools (FFS)initiated by Ministry of Agriculture, Food and Cooperatives extension division
Exploitation by unscrupulous buyers	TCB to notify farmers on seed cotton indicative prices through radio announcements

Table 3.5 summarises the constraints faced by ginners and possible solutions.

Table 3.5 Summary of constraints faced by ginners

Constraint	Possible solution
Shortage of seed cotton	Increase farmer yields. Outgrowers contracted by ginners could increase volumes.
Mixing of seed lowering quality	TCB to outsource seed multiplication, cleaning, packaging and distribution to private companies
Seed cotton purchases that bypass the passbook system	All licensed seed cotton buyers to follow a single system of recording purchases and thereby an accurate feedback of cotton areas per buying post
Low quality seed cotton through poor field husbandry	Farmer Field School (FFS) as channel for training in best farming methods. Competition to reward leading FFS according to yield and quality
Lack of trained ginnery technicians	Government to establish institute for training ginnery technicians

Research

The two cotton research stations – Ukiriguru Cotton Research Station (UKRS) and Ilonga Agricultural Research Institute (IARI) – are considered to be moderately well performing. Both have successfully released new varieties and introduced sound pest control and agronomic practices. The output could have been greater had research funding been improved, and this lack of funding must surely reflect on the performance of the research staff. The staff are paid by the Ministry of Agriculture, and many workers have had long service. Many are now approaching retirement and it is debatable if government will replace them on retirement. Past staff redundancies have resulted in staff shortages and these posts have not been filled in recent times. Research workers do not receive in-service training and poor funding does not allow them to attend international conferences and meetings, which are essential for progressive research. The post of fibre-technologist at Ukiriguru has not been filled and does not appear to exist at Ilonga. Such work is necessary during the development of new varieties. There have been no new varieties released since 1990. The libraries are poorly funded and lack international journals on agricultural research. There is also a lack of communication between research workers at the two research stations. Closer liaison would improve the quality and quantity of their output. The

TCB has set up a crop development committee which could enhance research, but so far this has not met.

Lack of funds appears to be the biggest limiting factor in the development of satisfactory research. The Ministry of Agriculture should provide greater funding for research activities at both research stations. This should take the form of salaries for research workers, especially to fill vacant posts that were previously declared redundant. Funding of research projects is another area that requires attention. This needs to be improved and there is also a need for financing transport to allow for off-station trials and extension. Funds are necessary for trials, transport, laboratory equipment, library and attendance of meetings locally and internationally. Money for these could be forthcoming from the Ministry of Agriculture, CDF and the private sector. Perhaps the European Union, World Bank and United Nations could also be approached for donations.

Extension

One of the main reasons for the low cotton yields attained in Tanzania is the poor extension services provided to farmers. Extension is provided both by the Ministry of Agriculture and the TCB, which employs 11 extension officers (Eos). The number of extension officers in the country falls seriously short of what is required. The Ministry has less than 50% of staff requirements. Lack of funding for employment, recruitment and training of EOs is perhaps the single most factor limiting the outreach to farmers. This lack of funds extends to the provision of transport of workers to farmers. For example, in Mwanza there are only seven vehicles (of which two are defective) amongst 100 district Eos, and 20 sector-cycles and 19 bicycles in over 200 village EOs. One of the few strengths in the extension service is that the EOs appear to be well trained and knowledgeable.

There is an urgent need for funding to increase the number of EOs, especially at village-level. At present it appears that one EO services some 1,500 households. With such vast numbers it is not possible to provide satisfactory service to farmers. The Ministry of Agriculture and the CDF should look into prioritising funding for such important service to farmers by strengthening of extension services which could lead to higher production on farms.

Extension service could be part of research station activities and should be part of the services provided by them. This could reduce some of the overheads in the extension department. It would also make for easier in-service training of officers. The EOs from the TCB could also be incorporated into the existing structure.

Seed production

The seed used for planting is not certified and in the past varieties have been mixed at ginneries with resultant loss in disease resistance and losses in yield and lint quality. Because of this, the TCB have suggested that privatisation of this sector to overcome these problems should be recommended. Talks have already taken place on this subject with Quoton in Zimbabwe and the US seed company Delta Pine have shown interest.

De-linted cotton seed from cotton supplied to ginneries is utilised for seed by farmers (de-linted seed). A problem however, has arisen in the past from the mixing of varieties ginned, and this has resulted in a deterioration of resistance to diseases and subsequent yield losses. Because of this, the TCB has suggested that privatisation of this sector to overcome these problems should be recommended. Talks have already taken place on

this subject with Quoton in Zimbabwe and the US seed company Delta Pine have shown interest.

In Zimbabwe, the rights for all varieties including those developed by the Cotton Research Institute are held by Quoton. It pays royalties for these to the Research Institute for the cotton seed sold to farmers. Quoton also have their own breeding and research division, which is currently developing their own varieties.

Access to finance

Farmer

Access to finance is a huge challenge for the farmer. This has been recognised by the TCB which is piloting a passbook system to enforce savings by the farmer to secure inputs for the next season. A wide network and well established micro-financing industry exists in Tanzania (this industry is a subject in itself and will not be covered in this report). However, an interest rate of between 20% and 30% does not allow the farmer to access these loans, as the profit margins of the farmers limits their ability to carry the additional financing costs. The inherent risky nature of farming also results in the interest rate for farmers being high due to their high risk profile.

Commercial banks will not deal with individual farmers, but would look at group schemes such as those offered by the National Commercial Bank. This would require farmers to group themselves or operate through an organisation in order to access the loan. The current interest rate for such a loan is between 14% and 20% depending on the risk profile.

Exim Bank is currently working in collaboration with the Tanzanian Government to provide agricultural inputs to farmers. Farmers apply for input loans through villages based organisations. These loans are channelled and approved by the Ministry of Agriculture who then forwards the list to Exim Bank, who administer the process. The bank itself then interviews the farmers and further refines the list before approving the loan. The loan is subject to the farmer being able to provide security and a title/lease (two years) deed on his/her land. This is currently problematic and is impeding access to this mean of finance.

Gin

Finance is more readily accessible to the gins than to the farmers. This is as a result of the gins having more assets to assign as security and collateral. Gins can use tools such as the Warehouse Receipt System (WRS) to secure loan financing. The WRS uses the gins stock on hand of lint as security for raising loan financing. Because of the tangible nature of the assets associated with gins, investors are more likely to invest in such a venture, allowing capital to be raised for refurbishment.

Gins that have a secured market and a good relationship with their clients can also secure advanced payment on shipments of lint. Government also offers a range of facilities which include export credit guarantees, central bank refinancing schemes, export-import bank facilities, and credit insurance facilities. Local commercial banks offer a range of financing and “insurance packages” services to the ginning industry, such as those services offered by the CRDB Bank:

Provision of pre-shipment and post-shipment financing facilities.

- Help in the collection process.
- Advise and confirm letters of credit.

- Booking of acceptance and discounting of drafts.
- Offering of advisory services such as providing credit and country information on the buyers free of charges.
- Taking foreign exchange risks (spot, forward, swap etc).
- Taking market risks (options).

Textiles

Skills and labour productivity

Labour costs are generally considered to be low in Tanzania, and labour is seen by industry to be of lower productivity compared to Asia (China, Pakistan, India). For example, one operator estimated that it takes 12-14 minutes for a Tanzanian factory worker to make a t-shirt compared to 7-8 minutes in China.

World Bank (2004) attempts to measure labour productivity in Tanzania and finds that overall value added per worker was about US$2,028 for the median enterprise in Tanzania in 2003. This was higher than in Uganda (US$960 per employee), but considerably lower than in India (US$3,214 per employee in 1999), Kenya (US$3,551 per employee), or China ($4,397 per employee in 2002). In the textiles, garments and leather sector, value added per worker was estimated at US$950 per worker in Tanzania, compared to US$1,617 in Uganda and US$2,013 in Kenya. The same study finds that workers in Tanzania tend to have considerably less formal education than workers in either Kenya or Uganda. Some 43% of workers in Tanzania have only a primary education, compared to 20% in Kenya and Uganda. The main cause of this gap appears to be Tanzania's low levels of secondary and vocational education. There is little difference between Tanzania and the comparator countries with respect to tertiary education.

Another issue of concern is that enterprises in Tanzania were less likely to have formal training programs than enterprises in either Kenya or China (but not Uganda). Tanzanian firms with formal training programs also provided less training than their counterparts in the comparator countries. Enterprises without formal training programmes generally reported that they were unable to afford a formal programme or that informal training was sufficient. But contrary to the latter belief, formal training appears to pay off. Total factor productivity was 11% higher in Tanzanian enterprises with formal training programs.

The particular lack of vocational skills in the sector was echoed by the interviews and observations made during the factory visits undertaken in this study. Upgrading of technology in the industry will require a more skilled workforce (in particular, in mechanical engineering) than is currently present in the industry.

3.3.2 Design[9]

The design process has the potential to add value to a company by encouraging creativity and innovation; in the fashion/textiles sector this includes developing leading edge trends, exploitation of new fabric/processes, new marketing strategies, etc. SMEs, particularly in the handicrafts sector, are very aware of the need to upgrade their design skills to achieve greater commercial success. The larger manufacturing sector appears to be less concerned.

[9] See Annex D for a more detailed discussion of textiles design capabilities in Tanzania.

Many have invested in computer aided design (CAD) technology but do not utilise it to its full capacity, because they generally manufacture according to designs and materials supplied or demanded by their buyers. The large manufacturers, therefore, use CAD technology as a tool to communicate, negotiate and speed up the process of manufacture. Any design that does take place design is more about amending currently popular designs (through amending colour, rather than new prints etc) or commissions by buyers. Designers are invariably recruited from overseas. No factories appear to provide training in design.

The lack of a design training school in Tanzania limits any deeper analysis of consumer trends to anticipate future tastes. Lack of design training and access to research therefore places a particular constraint on the sector – both handicraft and large-scale. The large manufacturing factories currently rely on buyers or agents for design ideas. Although they have CAD facilities, their work in this area generally focuses on amending past successes rather than creating new successes. There is a risk that a reliance on buyer's understanding of their customer and setting the brief makes manufacturers very susceptible to the fortunes of competition from other low-priced manufacturers.

3.3.3 Technology and quality

Annex B reports that although there are several exceptions, the general technical level of the textiles industry in Tanzania is very out of date with most of the equipment being 30 or more years old. Machinery is often poorly maintained and factories suffer from a shortage of

spares, running down old capital rather than reinvesting and upgrading it. This seriously restricts the production level and quality of the products.

This picture is primarily the case for sections of the industry producing bed linen, khanga and kitenge for the highly protected local market. The export oriented section of the industry generally produces to international standards, with modern machinery and labour conditions. The industry is highly dualistic in this regard.

However, further expansion of the export-oriented garment industry is hampered primarily by the lack of high-quality locally manufactured fabric. Sewing machines are relatively inexpensive in terms of capital expenditure, but clothing demands a variety of good quality knitted and woven fabrics. If such materials were available within Tanzania, the European market would become more accessible. Sales into the EU are currently precluded by the rules of origin which effectively require fabric to be sourced in the country in which the clothing is made.

4. Sector goals and strategy

4.1 Goals

The goals set out for this study are ambitious. They are as follows:

1. Increase lint cotton production from 700,000 bales produced in 2005/06 season to 1,500,000 bales.[10] This is equivalent to a growth from 127 million kilograms to 272 million kilograms.
2. Raise yields from 750 kg/ha to 1,500 and 2,500 kg/ha by year 2010 and 2015 respectively.[11]
3. Increase the proportion of cotton lint consumed by domestic industry from the current level (around 30%) to 90% by year 2015.

This implies the following:

- An increase in seed cotton production from 333 million kilograms to 714 million kilograms over an eight year period.
- An increase in domestic processing of cotton lint from current levels of around 38 million kilograms to around 245 million kilograms by 2015 – an increase of 650% or an annual increase of around 27%.

4.2 Cotton strategy[12]

A further increase in seed cotton production is central to the development of the sector, and could be a valuable source of additional income to farmers. Increasing yields in the WCGA will require the application of better farm and crop management practice. Additionally, there are good prospects for an expansion in the area of land used for cotton cultivation, particularly in the ECGA. A promising way of enabling this appears to lie in the development of farmers as out-growers linked to commercial companies (e.g. ginneries) operating in the areas. This could lead to larger scale farms. Three companies, including Golden Ginners and Morogoro Ginnery, have shown interest in this development.

Under such a system, of which there are successful examples in South Africa, a company would establish a ginnery and farm land surrounding this commercially. This would serve as a hub, around which smallholder farmers produce cotton. On the commercial farmland, modern farming practices are used. Equipment used for this is available to assist the smallholder farmer and is hired out to mechanically plough land and spray crops. This has been done successfully with accompanying yield increases by the small holder farmer.

Conservation agriculture (CA) methods are proposed, because they are considered to be appropriate to overcome the severe cotton yield losses through difficulty in controlling weeds using hand hoes. This places emphasis on crop rotations and integrated pest management systems. The main focus of the proposed technologies to improve cotton yields is to ensure that both the food crop and cotton are grown using labour efficient methods to ensure timely planting, thinning and weed control. Integrated weed control will involve crop rotations, herbicides instead of hoeing and green manure crops as “smother

[10] In Tanzania, one bale weighs an average of 181 kg.
[11] These targets are set out in Tanzania Cotton Board Corporate Strategic Plan (2007/08-2009/10).
[12] See Annex A

crops". Minimal soil disturbance using herbicides and animal traction no-till planters or V-hoes at planting time to place fertiliser or manure and seed in the soil will also reduce weed germination. This is because many weeds require soil disturbance and exposure to light in order to germinate.

Upgrading of gins and improvements in the upkeep and management of the ginning facilities will go a long way to reducing the contamination of lint and improving the prices for lint secured by gins. A stringent programme of cotton grading and classing associated with price differentials for various grades will allow gins to realise returns on capital invested in upgrading their facilities. This will, in addition, require a feedback mechanism to gins on the quality and grade of their lint. The implementation of a mutually beneficial relationship between growers and gins would also ensure that the gins can accurately predict both the volume and the quality of seed cotton available in the coming ginning system. This would to some degree bring back elements of the old zoning system.

To foster the introduction of the new agricultural methods supported, we suggest the introduction of demonstrations in three districts in the WCGA and one district in ECGA. Each district would initially have three demonstrations each and laid out on farmer's fields with 2.5 acres per demonstration, made up of five plots of 0.5 acres assigned to the following: farmer practice food crop, farmer practice cotton, conservation agriculture food crop, conservation agriculture cotton, variety trial with food crop and cotton. Growing of the food crop and cotton would be rotated on an annual basis to help control insects and weeds.

Farmers under the initiative must have access to inputs such as seed, fertilisers and chemicals for their annual farming operations. Access implies both availability of the inputs and the ability of farmers to purchase these inputs. In order to achieve this, most farmers require loan facilities for their input costs.

4.3 Textiles strategy

The substantial increases in textiles manufacturing levels envisaged in the sector targets require large levels of FDI. The government's 'Mini-Tiger Plan' (Government of Tanzania 2004) envisages that the garment and textile sector is one of the most promising industrial sub-sectors for attracting FDI. In attracting FDI, Tanzania will need to persuade investors of the advantages that it possesses over alternative investment destinations, including political stability, government commitment to economic reform, good access to the regional market, access to many international markets on preferential terms, low inflation and macroeconomic stability, three international airports (Dar es, Salaam, Mwanza, and Kilimanjaro) and three major seaports (in Dar es Salaam, Tanga, and Mtwara). If the experiences of Lesotho and Mauritius are anything to go by, FDI is most likely to come from Far East textile enterprises searching the world for new manufacturing locations.

Unlike the previous model of development for the textiles sector in Tanzania, an integrated value chain should not necessarily be targeted. In the short-term, given the low quality of local produced fabric, many companies producing finished garments for the export market (in particular the US) are likely to continue to require imported fabrics as inputs (although EU rules of origin are likely to restrict the ability of these producers to supply the EU). This means that domestic consumption of cotton will not necessarily increase immediately as a result of the growth in this part of the sector. However, given the availability of good quality cotton locally, growth in garment manufacturing (which appears to be the most promising sector for grow in the short-term) is likely to create incentives for investment in modern spinning, knitting and weaving industries over the medium-term , which in many cases may

form separate enterprises to those producing finished apparel. This will be particularly important in accessing the EU market. Alternatively, investments may in some cases involve the rehabilitation of existing plants, where there is considerable scope for increasing capacity utilisation and investments in more modern production and management techniques.

Although the main growth opportunities appear to lie in producing for export markets to the US and EU, there is still scope for some growth in the textiles industry producing Khanga and Kitenge for domestic and regional markets. However, this growth is most likely to come about from increased utilisation of existing capacity.

To enable private sector-led growth, the government will need to provide a strong enabling environment which tackles the key constraints to the sector's performance, including specifically targeted interventions, discussed in section 5. This will be required to attract the considerable investment in the sector required if the goals of the strategy are to be met.

Spinning investments
If Tanzania is to increase the proportion of cotton processed domestically to 90%, due to the outdated machinery and poor condition of many of the factories, it will not be viable to upgrade existing machinery for increased production. Instead, investment in modern machinery is the only option if the capacity of the spinning industry is to be increased.

The total investment in spinning machinery required to process an additional 200,000 tonnes of cotton lint per year is estimated at around US$500 million at current prices, excluding building and operating capital, but assuming the purchase of first hand equipment The cost would be higher for rotor spinning (which is a faster technology).

Weaving investments
When the redevelopment of the textile industry has addressed the problems of the spinning sector, revitalisation of the weaving stage becomes feasible, and once clothing-quality fabric becomes available, the range of garments that can be produced and exported will be greatly increased.

Several aspects of the weaving operations are below the standard required if Tanzania is to meet these targets. The old shuttle-loom technology, which is dominant throughout the country, needs to be supplemented or replaced by wider and faster looms based on more modern technology. Such equipment can weave wide bed sheets, or may alternatively be used to manufacture multiple fabrics simultaneously side-by-side across the loom. The currently operating weaving groups should consider collaborating over the purchase of the same type of shuttleless loom, so they can make communal provision for appropriate training and for a supply of spare parts. An indicative estimate of the cost of new looms and associated equipment capable of weaving 200,000 tons of yarn per year is also about $500 million (see Table 6.1 and notes).

The adoption of this technology needs to be accompanied by a transformation in the performance of the workforce. To this end, specialist engineers and trainers need to be available within the mills and the workforces need appropriate training and retraining as necessary. A centralised training facility could most efficiently provide the required training of weaving technicians across the country. The engineering department of Dar es Salaam University might usefully be able to provide such a facility providing suitable specialisms could be introduced there.

Processing investments

Most domestic producers are content with producing for the local market. However, to increase domestic processing of 245,000 tonnes of cotton lint will require production for the export market, which will require a change in operating systems and a re-education of workforces in existing facilities to operate in a more competitive quality driven market.

Provision for processing polyester/cotton blends needs to be made as the international market will demand this option. Careful selection of operatives and rigorous training is essential to meet the demands of a modern, efficient quality-driven facility.

The construction of new facilities is likely to be required. Three examples below illustrate the costs of building several types of facility[13]:

- To produce 75 million metres of shirting fabric per year, the set-up cost would be around US$51 million. The factory would consume around 18,750 tonnes of cotton yarn.
- To produce 75 million metres of bed sheet fabric per year, converted into flat sheets and pillow cases, the set-up cost would be around US$80 million. The factory would consume around 29,250 tonnes of cotton yarn.
- To produce 50 million metres of single jersey fabric, the set-up would be around $35 million is required. This facility would consume 13,500 tons of cotton yarn.

Clothing investments

The clothing industry is and can continue to develop independently of developments in the spinning and weaving sub-sector. Increases in garment manufacturing have the potential to provide significant economic benefits to Tanzania because the capital outlay is comparatively small and a large number of jobs could be created, mostly for women.

In deciding on the export markets to target, the current export logistics situation means that Tanzania is probably best suited to supplying “continuity products”, such as bed sheets, towelling, and undifferentiated garments (e.g. t-shirts and knitted underwear) rather than fashion garments. However, with future investments in infrastructure and textile production capability and capacity, the supply of fashion items could become an option for the future, particularly as technical capacities and labour skills have improved through greater exposure to the international market.

The required investments in spinning and weaving capacity are likely to become increasingly viable and attractive as the clothing industry develops. This already appears to be happening on a fairly small scale, where garment manufacturers are looking to invest in downstream production capacity so as to enable a more reliable supply and quality of inputs.

[13] These values do not include costs of buildings, emergency stand by generator capacity or working capital.

5. Policy recommendations

The most important role for government in encouraging the development of the cotton and textiles sector will be in ensuring that the necessary policy environment, infrastructure and incentives are in place. Section 3 of this report highlighted a number of existing constraints. This section summarises the reforms that will be required to address these.

5.1 Trade policy

Being a member of the EAC, which has a common external tariff, Tanzania is not able to change its tariff policy unilaterally. However, at appropriate opportunities, the government should encourage a review of exceptions to the CET. As argued in section 3.1.3, current exemptions have led to a situation where several firms in the textiles and clothing sector are "value sub-tractors", meaning that their operations are a waste of economic resources. The policy also negates incentives for production for the international market and for innovation and improved efficiency. Such reforms would do more to improve export incentives (by reducing the existing anti-export bias in the sector) than any targeted export incentive scheme.

5.2 Tax policy and fiscal incentives

Tax incentives might also be used to promote vertical integration of the textile sector. This is a policy that has been pursued by the Mauritian government, which has introduced a special package of incentives for the promotion of investment in spinning mills. The scheme in Mauritius includes a special tax credit of up to 60% of the equity invested, spread over a maximum period of six years. Land is also being provided for lease at highly concessionary rates.

Well functioning EPZs have been essential in supporting the development of a modern and competitive textiles sector in a number of countries. In particular, to address in a targeted manner problems that the industry faces relating to the reliability of power and water supplies, as well as transport infrastructure and logistics. Many of the textiles producers competing with Tanzanian exporters are also located in EPZs, meaning that the tax incentives also need to be competitive.

Whilst the fiscal incentives provided under EPZs are in line with international best practice, the absence of publicly owned dedicated EPZ facilities with reliable power and electricity supplies, efficient logistical procedures and cheap rent places a constraint on the development of a modern and competitive export-oriented sector. The EPZA needs to work closely with the water and power providers to develop a comprehensive strategy, application procedures, and streamlined approval processes to ensure that future EPZ facilities are constructed with adequate water and power capacity and connections to support various types of EPZ activities. And for the benefit of the sector, it would seem preferable for the government to concentrate its energies on the development of EPZs, rather than the more ambitious programme of developing SEZs.

5.3 Regulations and business environment

The development of the cotton and textiles sector, and the private sector more generally, will benefit greatly from continued efforts by the government to strengthen the business environment, for example through the "Business Environment Strengthening for Tanzania"

(BEST) programme. Efforts are required to improve Tanzania's world rankings for ease of doing business in order to attract much-needed FDI.

5.4 Infrastructure

Poor infrastructure is perhaps the greatest constraint to the industry. The following areas require priority attention in order to facilitate the development of the cotton and textiles sector.

- Investment in the country's railway infrastructure, in particular that connecting the cotton growing regions with Dar es Salaam.
- Investment in secondary and tertiary roads in cotton growing areas.
- Computerisation of port clearance procedures.
- Provision by Tanesco of preferential access by the industry to power, particularly during times of power rationing.

Most of these areas are generic in nature, meaning that the gains from investment in these areas will be of wider benefit to the economy. Additionally, this implies that such investments should be considered in the context of Tanzania's broader development strategy.

5.5 Research, extension and seed production

The Ministry of Agriculture should work with the CDF and the private sector to find sources of greater funding for research activities at both the UKRS and IARI cotton research stations. Additionally, there is an urgent need for funding to increase the number of extension officers, especially at village level. Extension service could be part of research station activities and should be part of the services provided by them. This could reduce some of the overheads in the extension department. It would also make for easier in-service training of officers. The EOs from the TCB could also be incorporated into the existing structure. Extension is not the monopoly of the government. The private sector, especially the chemical suppliers, could become more involved in providing training on the use of pesticides, scouting and spraying equipment. There should be incentives to provide better services to farmers. Ideally, there should be an objective to provide one EO per every 300-400 households (farmers). Such an EO should be mobile and provided with motor-cycles to allow 3-5 visits per day. This could allow over 100 visits per month.

5.6 Institutional development

In the cotton sector, we propose that efforts be made to improve the coordination of different stakeholders engaged in cotton production in Tanzania. This could either be achieved through the strengthening of existing capacities within TCB, or through the creation of a new coordinating body. Our preference is currently for the former option, in order to avoid the creation of institutions with duplicating functions. Technical assistance will be required to ensure that capacities are in place to fulfil this function effectively, which will include providing technical support and guiding prospective farmers in setting up farming businesses along sound development strategies.

Box 5.1 The Tanzania Cotton Board

Formed in 2001, the TCB regulates the industry through the regulations for cotton cultivation, marketing, processing, importation, exportation and storage of seed cotton and lint. Additional regulatory functions are issuing of permits and licenses to buyers of seed cotton, exporters of cotton lint, operators of ginneries and in determining the qualifications for granting such permits. Additional functions are to promote growth of production, processing, quality, marketing and export of cotton, stimulation of cotton research and extension, and the collection and dissemination of information on the cotton sector. The TCB advises Government on all matters affecting the cotton industry, and promotes the establishment of associations of stakeholders.

In the textiles sector, we propose the creation of an agency, the Textile Sector Development Unit, TSDU, to promote and coordinate investment and training. Training would include in design and textiles engineering and would require collaboration between a variety if institutions. We suggest the unit be made up of a 2-3 person team, which would have an oversight and coordinating role. Given the potential importance of EPZs in attracting investment and addressing some of the logistical and infrastructure challenges in the sector, the TSDU would need to work closely with the EPZ Authority. The two bodies would need to coordinate closely in fulfilling the kind of roles undertaken by the Clothing and Textile Centre in Mauritius (see box 3.2). Additionally, the agency would need to coordinate closely with related regional initiatives, including ACTIF (see box 5.1). Our proposal is that both of these responsibilities are held by a Textile Sector development Unit (TSDU) which should be housed within the TCB.

Box 5.2 The RATES Cotton Programme

The Regional Agriculture Trade Expansion Support (RATES) programme is a five-year programme funded by USAID. It is designed to increase agricultural trade within the East and Southern Africa region and between the region and the rest of the world. The cotton component of the programme targets the textile industry, as a main buyer of regionally (and mostly smallholder) produced lint, and as a seller of textile products to the apparel sector taking advantage, where applicable, of opportunities provided under AGOA. This is based on the premise that the resulting increase in regional demand for cotton will translate into improved market opportunities for smallholder farmers.

The programme initiated the formation of the African Cotton and Textile Industry Federation (ACTIF), which has the mandate to develop and strengthen regional markets and to promote and implement programs for improved regional competitiveness that position the sector to work to best advantage in national, regional and export markets. Specifically, ACTIF engages in the following activities:

- Efforts to enhance market access for regional exporters, particularly to the US and EU markets.
- Given that the spinning and weaving sector is the weakest link in the regional supply chain and identifying investment opportunities in the sector is critical to the dynamics of the regional supply chain, RATES is assisting ACTIF with TA to research, liaise and assess pro-investment schemes and to act as an investment information source for the sector. Enhance inter-regional trade and supply chain in cotton products. Efforts have included the establishment of www.cottonafrica.com which links buyers and sellers in the region and enables them to communicate with each other. Efforts to exchange information on latest research and technologies in cotton production and encourage niche market development, such as organic and Fair Trade.

5.7 Human resources

The main constraint that appears to hinder labour force productivity in the cotton and textiles sector is the lack of vocational skills, including in mechanical engineering and design. Further consideration needs to be put into setting up an industry-specific training school, perhaps connected to the College of Engineering and Technology which is part of Dar es Salaam University. Such a school could also provide high precision engineering facilities, which will increasingly be required by the industry as it develops.

The newly established central training department should act as a spares depot, to supply the weaving installations with parts of the correct type and quality. It would then be possible to monitor the spares being consumed by the weaving companies and recommendations could be made to reduce spares consumption.

With regard to design, the primary area of concern for the design and marketing of the Tanzanian textile and clothing industry is that there is very little design training and, in particular, methods of instilling creative thinking within product development. To develop design training in Tanzania, there needs to be several levels put into place: foundation and degree level (with the aim of developing towards postgraduate). Although there are no degree level courses available in textile and clothing, there are networks and colleges providing elements of courses that may be networked together to provide the fundamentals. The foundation level would be the most immediately attainable. The estimated annual cost of establishing and running a foundation level course is in the region of US$100,000 per year (see Annex F).

Annex D recommends that efforts should be made to develop the local handicrafts sector based on the India model. Recommendations of how this should be enabled include:

- Establish a city centre handcraft store (for the passing tourist).
- Establish study tours aimed at overseas designers and artists to view handcraft as it is being made.
- Develop a research centre to share market knowledge as well as skills knowledge
- Develop MoU's with overseas universities.
- Establish scholarships for students to study abroad.
- Establish 'sabbaticals' for designers and teachers to come to Tanzania and teach their skills.
- Establish links between retailers and suppliers.
- Organise a series of promotional tours.
- Establish a museum of handcraft that has links with the educational institutes as well as the handcraft sector.

6 Investment plan, financing sources and socio-economic impact

6.1 Investment plan

Based on the preceding findings in the report, this section presents an indicative investment plan for a Cotton and Textile Sector Development programme, which would be complementary to existing programmes in the sector, including the TCB's corporate plan. The plan is divided into two phases. The first 'Development Phase', which lasts from 2008-10, is intended to put the necessary enabling environment in place to attract the considerable private sector investment which will be required to achieve the plan's targets. The subsequent 'Investment Phase' lasts from 2011-15.

Table 6.1 illustrates the anticipated costs associated with the development plan. Costs that will be met by the public sector and/or donors are separated from those to be met by private sector investors. The plan excludes cost of generic investments in the enabling environment which will be important to encourage the required investments in the sector, including upgrading of EPZ facilities, investments in infrastructure (including railways roads, ports and utilities), and technical assistance related to policy reform, for example relating to trade policy and the regulatory environment.

The table shows that the public sector investments will total US$7.2 million in the Development Phase and US$8.3 million in the Investment Phase. Private sector investments required to enable the local textiles sector to process 90% of lint produced would be substantial – estimated to be in the region of US$935 million over the eight year period of the plan. However, this figure is subject to a range of technological choices, including that between first and second-hand equipment. If second hand equipment were purchased, a more realistic figure would be US$500 million.

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Table 6.1 Aggregate Indicative Investment Costs:

	Notes	Development Phase				Investment Phase						Total (devt & inv phase)
		2008	2009	2010	Total	2011	2012	2013	2014	2015	Total	
Ouput targets :												
Lint Cotton output ('000bales)	1	940	1,020	1,100		1,180	1,260	1,340	1,420	1,500		
Volume processed locally('000t)	3	81.7	99.7	119.5		141.0	164.2	189.2	215.9	244.4		
Costs (US$ million)												
A. Public sector investment programme												
A.1 Cotton Production	4											
A.1.1 Research System		0.1	0.1	0.2	**0.4**	0.2	0.2	0.2	0.2	0.2	**1**	**1.4**
A.1.2 Extension		0.3	0.3	0.5	**1.1**	0.5	0.5	0.5	0.5	0.5	**2.5**	**3.6**
A.1.3 CA Demonstrations		0.31	0.25	0.25	**0.81**	0	0	0	0	0	**0**	**0.8**
A.1.4 CA Outreach		0.3	0.4	0.5	**1.2**	0.5	0.5	0.5	0.5	0.5	**2.5**	**3.7**
A.1.5 Ginnery 'hubs'		0.5	1	0	**1.5**	0	0	0	0	0	**0**	**1.5**
A.1.6 Research viability of Fairtrade cotton		0.15	0	0	**0.15**	0	0	0	0	0	**0**	**0.15**
Sub Total		***1.66***	***2.05***	***1.45***	***5.16***	***1.2***	***1.2***	***1.2***	***1.2***	***1.2***	***6***	***11.16***
A.2 Textile Production												
A.2.1 Textile Training UDSM/COET	5	0	0	0.1	**0.1**	0.1	0.1	0	0	0	**0.2**	***0.3***
A.2.2 Textile Eng Training (U of M)	5	0.2	0.2	0.2	**0.6**	0.2	0	0	0	0	**0.2**	***0.8***
A.2.3 Design Training (VETA)	6	0.1	0.1	0.35	**0.55**	0.35	0.35	0.35	0.35	0.35	**1.75**	***2.3***
A.2.4 Textile Sector Development Unit (TSDU)	7	0.3	0.3	0.2	**0.8**	0.2	0.2	0.2	0.2	0.2	**0.2**	***1.8***
Sub Total		***0.6***	***0.6***	***0.85***	***2.05***	***0.85***	***0.65***	***0.37***	***0.37***	***0.37***	***2.35***	***4.4***
TOTAL PUBLIC SECTOR INVESTMENT		***2.26***	***2.65***	***2.3***	***7.21***	***2.05***	***1.65***	***1.55***	***1.55***	***1.55***	***8.35***	***15.56***
B. Required private sector investments												
B.1 Rehabilitation of Ginneries	8	0.3	0.5	0.7	**1.5**	8.0	8.0	8.0	8.0	8.0	**40.0**	41.5
B.2 Spinning Capacity	9	2.0	5.0	50.0	**57.0**	50.0	50.0	100.0	100.0	150.0	**450.0**	***507.00***
B.3 Weaving capacity	10	1.0	3.0	50.0	**54.0**	50.0	50.0	100.0	100.0	150.0	**450.0**	***504.***00
B.4 Processing Capacity	11	1.0	2.0	30.0	**33.0**	12.0	20.0	20.0	20.0	20.0	**92..0**	125.0
B.5 Garment Manufacture	12	0.5	0.5	0.5	**1.5**	10.0	10.0	10.0	10.0	10.0	**50.0**	51.5
TOTAL PRIVATE SECTOR INVESTMENT		**4.3**	**11.0**	**131.22**	**147**	**130.0**	**138.0**	**238.0**	**238.0**	**338.0**	**1082.0**	**1229.** 0

Notes:

1. Projects growth from 2005/6 level of 700,000 bales at 8% per year
2. At 40% loss in ginning process
3. At annual increase of 28%
4. Indicative costs - see Annexe A
5. US$40,000 per head for five post graduates for three years and subsequent launch of textile engineering capacity at COET
6. Based on initiation of design training modules at VETA institute and international exchange programmes from Year 3
7. Assumes three person team inTSDU
8. Assumes investments in rehabilitation of 20 ginneries with saw ginnery technology at a cost per ginnery of US$2 million.
9. Assumes initial increase in output from existing plant; investment phase based 2.3M spindles and includes equipment, building costs and working capital
10. Assumes in 2015 total of200,000 tonnes of yarn, 18 tonnes of yarn per loom p.a. and cost per loom of US$100,000 with additional costs for building and working capital
11. Average of costs associated different strategies as in Section 4.3 of this report

Table 6.2 provides further detail on the Public Sector Investment Plan by providing preliminary indications of the implementing agencies, costs, funding sources and targets for each activity.

Table 6.2 Public Sector Investment Plan

Activity	Implementing agency	Cost and funding source	Target output	Timeframe
A.1.1 Research system – funds for trials, transport, lab equipment, library, and attendance at meetings	UKRS & IARI	US$1.4 million Ministry of Agriculture CDF Private sector International donors		2008-15
A.1.2 Extension – increase number of EO	TCB & Ministry of Agriculture	US$3.6 million TCB Private sector	Increase number of EOs to one for every 300-400 farmers	2008-15
A.1.3 Conservation agriculture demonstrations	TCB & Golder	US$0.81		2008-10
A.1.4 CA Outreach	TIC	US$3.7 million		2008-15
A.1.5 Pilot ginnery 'hubs'	Ministry of Agriculture	US$1.5 million		2008-09
A.1.6 Research viability of introducing Fairtrade cotton production in Tanzania	TCB	US$ 150,000	Fairtrade production introduced in Tanzania by 2009	2008
A.2.1 Establish Textile Training at UDSM & COET	UDSM & COET	US$300,000		2010-12
A.2.2 Provide textiles engineering training	University of Manchester	US$800,000	20 people trained by 2011	2008-11
A.2.3 Provide design training	VETA	US$2.3 million	100 people trained	2008-15
A.2.4 Establish Textiles Sector Development Unit	TCB	US$1 million	Development agency established and functioning on a sustainable basis	2008-11
Establish textiles investment line of credit	Development Bank (e.g., CRDB)	US$50 million (start-up capital)	Loans of a total value of US$X disbursed by 2010	2008-2010

6.2 Financing sources

The majority of the financing for the investments required to develop the textiles and clothing industry in Tanzania will need to come from the private sector. Much of the investment is likely to come from overseas, meaning that ensuring that the appropriate investment policies are in place will be essential.

Another approach to attracting investment to the sector, which has been applied by the Tanzania Investment Bank (TIB) in the cut flowers industry, would be to set up a line of credit specifically targeted at the textiles and clothing industry. The TIB has experience in managing several credits for the cut flower sector, under support from both SIDA and the government. A similar model has been applied in Mauritius, where, through the Development Bank of Mauritius, a Textile Modernisation Loan Scheme was set up. The loan ceiling was set at around US$700,000 and the interest rate was set at a concessional rate. A scheme has also been provided to finance the working capital requirements of textile companies.

Careful thought would need to go into the design of such a scheme, to ensure that funds are targeted at developing the modern and dynamic export-oriented sector. The managers of the scheme would need to work closely with the TSDU (proposed in 5.6). Additionally, further thought needs to go into establishing the source of such funding.

6.3 Socio-economic impact

Table 6.3 shows our estimates of the potential socio-economic impact of the plan. It shows the following key projections over the period 2007/15:

- The value of cotton lint production is projected to increase from US$117 million to US$204 million. Cotton production as a proportion of GDP will remain constant.
- The value of textiles and clothing production is projected to increase from US$691 million to US$3.5 billion. As a proportion of GDP, production will treble from 5% to 15%.
- As the proportion of cotton consumed domestically increases, exports will decline, from 96 million kilograms to 27 million kilograms.
- Employment in textiles and clothing (including SMEs) will increase from 103,000 to 219,000, implying the creation of 116,000 jobs.

It is clear that for a total public and private investment of about $1.2 billion from 2007/15 the returns in both economic and social terms are potentially very high.

Table 6.3 Socio-economic impact

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Plan targets									
Seed cotton production (million kgs)	409.6	447.7	485.8	523.9	562.1	600.2	638.3	676.4	714.5
Lint cotton production (bales)	860,000	940,000	1,020,000	1,100,000	1,180,000	1,260,000	1,340,000	1,420,000	1,500,000
Lint cotton production (million kgs)	155.7	170.1	184.6	199.1	213.6	228.1	242.5	257.0	271.5
Yield (kg/ha)	1,100	1,275	1,450	1,625	1,800	1,975	2,150	2,325	2,500
Proportion of cotton lint consumed by domestic industry (%)	38	44.5	51	57.5	64	70.5	77	83.5	90
Volume of cotton lint consumed by domestic industry (million kgs)	59.2	75.7	94.2	114.5	136.7	160.8	186.8	214.6	244.4
Value of production									
Value of lint cotton production (USD million) *	116.7	127.6	138.5	149.3	160.2	171.0	181.9	192.8	203.6
Cotton production as % GDP	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Value of textiles and clothing production (USD million)	691	920	1,185	1,487	1,825	2,200	2,613	3,064	3,554
Textiles and Clothing production as % GDP	5%	6%	7%	9%	10%	11%	12%	14%	15%
Exports									
Exports of lint (million kgs)	96.5	94.4	90.5	84.6	76.9	67.3	55.8	42.4	27.2
Exports of lint (USD million)	144.8	141.6	135.7	126.9	115.3	100.9	83.7	63.6	40.7
Lint cotton exports as % total exports of goods and services	3.9%	3.4%	3.0%	2.5%	2.1%	1.7%	1.3%	0.9%	0.5%
Incomes and employment									
Labour force (million)	19.5	19.9	20.3	20.7	21.1	21.5	21.9	22.4	22.8
Textiles and clothing employment (% total labour force)	0.5%	0.5%	0.6%	0.6%	0.7%	0.8%	0.8%	0.9%	1.0%
Employment in textiles and clothing	97,522	108,285	120,224	133,383	147,804	163,531	180,607	199,076	218,986
Employment in textiles and clothing (small-scale manufacturing)	82,522	88,298	94,479	101,093	108,169	115,741	123,843	132,512	141,788
Employment in textiles and clothing (large-scale manufacturing)	15,000	19,987	25,745	32,290	39,635	47,789	56,763	66,564	77,198
Farmers involved in cotton production	380,000	395,000	410,000	425,000	440,000	455,000	470,000	485,000	500,000
Cotton planting area (hectares)	84,905	80,066	76,394	73,514	71,193	69,284	67,686	66,328	65,160

Notes: * Value of lint is calculated as the volume of lint production multiplied by the lint producer price

Assumptions (2007-2015)

- Tanzania's exports of goods and services grow by 10% per annum.
- Real GDP grows by 7% per annum. This growth is constant across sectors.
- Growth in cotton production, yields, exports, etc is constant in percentage terms over the period.
- Cotton lint inputs account for an average of 7% of the value of Tanzania's textiles and clothing production and exports (in line with current proportions).
- All cotton used by domestic industries is domestically produced. There are no cotton imports.
- Large-scale employment in textiles and clothing manufacture rises in line with overall textiles and clothing production growth.
- Small-scale employment in textiles and clothing manufacture rises in line with real GDP growth.
- Labour force growth is in line with current population growth of 2% per annum.
- One bale of cotton lint weighs 181 kilograms.
- 38% of the weight of seed cotton becomes cotton lint after the ginning process.
- The lint export price remains constant at US$ 1.5 per kilogram.
- The lint producer price remains constant at US$ 0.75 per kilogram.

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ANNEX A

The Cotton Sector and its development potential

This Annex has been written by Golder Associates of South Africa in close collaboration with the Tanzania Cotton Board, farmers and ginneries. The team was led by Bill Berry and comprised by John Howcroft, Julian Ward and René Ford. Its recommendations for a Cotton Development Agency (CDA) were revised at the Stakeholders Forum on September 19th: these responsibilities will now be vested in the TCB.

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Executive summary

The underlying objective of this study is to develop strategies that will result in a 333% increase in on-farm seed cotton yields (from the current average yield of about 750 kg/ha to 2500 kg/ha by the year 2015 and initiate institutional and financing arrangements in the extension and ginning sector that will facilitate this increase.

In Tanzania, cotton is grown in 13 regions out of 21, under rain fed conditions. More than 95 % of the crop is grown in the Western Cotton Growing Area (WCGA) which comprises the 7 regions Shinyanga, Mwanza, Mara, Kagera, Tabora, Singida and Kigoma. The remainder of the crop is grown in the Eastern Cotton Growing Area (ECGA) which comprises of Manyara, Kilimanjaro, Tanga, Coast, Morogoro and Iringa regions. Production in ECGA and is centred in the Morogoro region. It is estimated that cotton is grown on about 300 000 to 400 000 hectares by up to 500 000 smallholder farmers, with limited use of purchased inputs. The number of farmers growing cotton fluctuates between 350 000 and 500 000 depending on producer price paid in the preceding season, weather patterns and competitiveness of cotton against other crops. All the cotton varieties grown in Tanzania belong to the American upland type, *Gossypium hirsutum* L.

The climate of Tanzania is generally favourable for cotton production at all elevations below 400m a.m.s.l, with the near equatorial latitudes of the country having favourable temperatures throughout the year, and greater than 650mm means annual precipitation (MAP) in most regions, which is the minimum rainfall required for rain-fed cotton production.

The soils of Tanzania are generally deficient in phosphorus and nitrogen and will benefit from additions of synthetic fertilisers or animal manures. Deficiencies of all macro-elements are likely to result after a number of years of cotton production without nutrient additions through fertilisers or manures. Crop rotations with legumes having nitrogen fixing rhizobia should help to improve N fertility in areas where rainfall exceeds 800mm, where the legumes can be grown as short duration fallow crop inter-seeded into maturing food crops, such as maize or sorghum, or as sole crops, with crop residues retained on the soil surface following harvesting of seed. The rhizobia organisms in the root nodules of certain legumes can fix atmospheric nitrogen and convert it to an available form for the host plant. Cotton is sensitive to low pH and the acid soils in parts of ECGA will need liming to reach full potential.

Levels of seed cotton production attained during 2004/05 and 2005/06 surpassed the production of 532,440 bales recorded just before liberalisation during the 1992/93 season. The main regions involved in cotton production are Shinyanga and Mwanza, which together produce up to 90% of Tanzania's seed cotton.

The Tanzania Cotton Board (TCB) is the arm of government to regulate the cotton industry. TCB regulates the industry through the formulation of regulations for cotton cultivation, marketing, processing, importation, exportation and storage of seed cotton and lint. Additional regulatory functions are issuing of permits and licenses to buyers of seed cotton, exporters of cotton lint, operators of ginneries and in determining the qualifications for granting such permits. Additional

functions are to promote growth of production, processing, quality, marketing and export of cotton, stimulation of cotton research and extension, and the collection and dissemination of information on the cotton sector. The TCB advises government on all matters affecting the cotton industry, and promotes the establishment of associations of stakeholders.

Other important stakeholders in the cotton industry in Tanzania are: the Tanzania Cotton Association (TCA); government research stations and extension services; co-operatives, which are being phased out; private sector buyers; ginners and exporters; cotton oil millers; and textile and apparel manufacturers.

Tanzania has 77 ginners, with 33 of these currently active (2006/07 figures), with ginning increasingly being done by private companies who are investing in modern roller gins. The estimated total capacity of existing ginneries in Tanzania is about one million bales. About 70% of this capacity was utilised in the peak production year of 2005/06, with 694,107 bales of lint produced.

The cotton growing areas have good main roads with asphalt laid on a good foundation. However, secondary roads are showing a need for maintenance, and tertiary roads are very poor. The TCB's strategy is to encourage seed cotton buying posts within a maximum distance of 8km from farmer fields. Since the majority of cotton is produced by smallholder farmers, who deliver their cotton to buying posts on foot, bicycle or ox cart, the poor roads are not considered a major problem for the farmer. The poor tertiary and secondary roads obviously impact on moving seed cotton from the buying posts to the ginneries.

Farmers mainly prepare their lands by hand using hoes, where the surface soil is cut and inverted as a weed control exercise, and to prepare a seedbed. Seeding of cotton is also done by hand using hoes. Fertilisers are rarely used, because of poor access to credit. Weed control is done by hand using hoes. Green ridging, or earthing-up of soil on both side of the cotton rows to form a ridge, is done during weed control. Farmers should weed their fields at least three times in the growing season to achieve a good crop of cotton. In reality, priority is given to looking after the food crop such as cassava, maize, rice or sorghum, with the cotton neglected and planted and thinned late, and infrequently weeded. Research at Ukiriguru Agricultural Research Institute (ARI), which serves the WCGA's cotton farmers, has found that late planting may reduce cotton yields by 68%, and late thinning and weeding may reduce yields by 59%. Soil fertility exhaustion, through continuous cropping without addition of fertilisers or manure, may lower cotton yields by 75%. Weeds are more of a problem in the ECGA with its higher rainfall. Ilonga ARI, serving cotton growers in the ECGA has found that for ECGA, late weeding and thinning may lower cotton yields by up to 65%.

New methods of crop production are proposed. The main focus of the proposed technologies to improve cotton yields is to ensure that both the food crop and cotton are grown using labour efficient methods to ensure timely planting, thinning and weed control. Integrated weed control will involve crop rotations, herbicides instead of hoeing, and green manure crops as "smother crops". Minimal soil disturbance, using herbicides and animal traction no-till planters or V-hoes at

planting time to place fertiliser or manure and seed in the soil, will also reduce weed germination. This is because many weeds require soil disturbance and exposure to light in order to germinate.

Well managed farmer fields were observed in the Mwanza area in May 2007. These fields had been planted to the variety UK91, in rows 1m apart and thinned to the correct plant stand giving a population of about 50,000 plants/ha and using cattle manure to improve soil fertility. The estimated yields were between 2,500kg and 3,000kg of seed cotton per hectare, based on number of bolls per plant and plant population density taken from randomly sampled plants in the field. This indicates that there is potential for good yields using the cotton varieties developed at the research station at Ukiriguru, serving the WCGA.

Gross margins were prepared for maize, sorghum and cotton using the farmer practice (current) and new technologies (improved). Gross margins represent income from the sale of the produce, less all direct costs that can be allocated to the production of the specific crop. Generalised production programmes were compiled for each of the proposed enterprises and indicative gross margins were calculated. These are shown in the following Table:

Indicative Gross Margins for various crops and production methods

	Current	**Improved**		
Crop		**Year 1**	**Year 2**	**Year 3**
	Gross margin (US $/acre)			
Cotton	48	70	126	181
Maize	62	63	93	123
Sorghum	5	8	25	42

It is important to note that variable costs increase using the improved methods. For example, the variable costs for cotton increase from $30 per acre to $100 per acre, a net increase of $70 per acre. This is a large increase for the resource of poor farmers and therefore the improvement programme is dependent on the farmer obtaining access to credit for this increase in input costs. The increase is more than compensated for by nearly a four fold increase in gross profit.

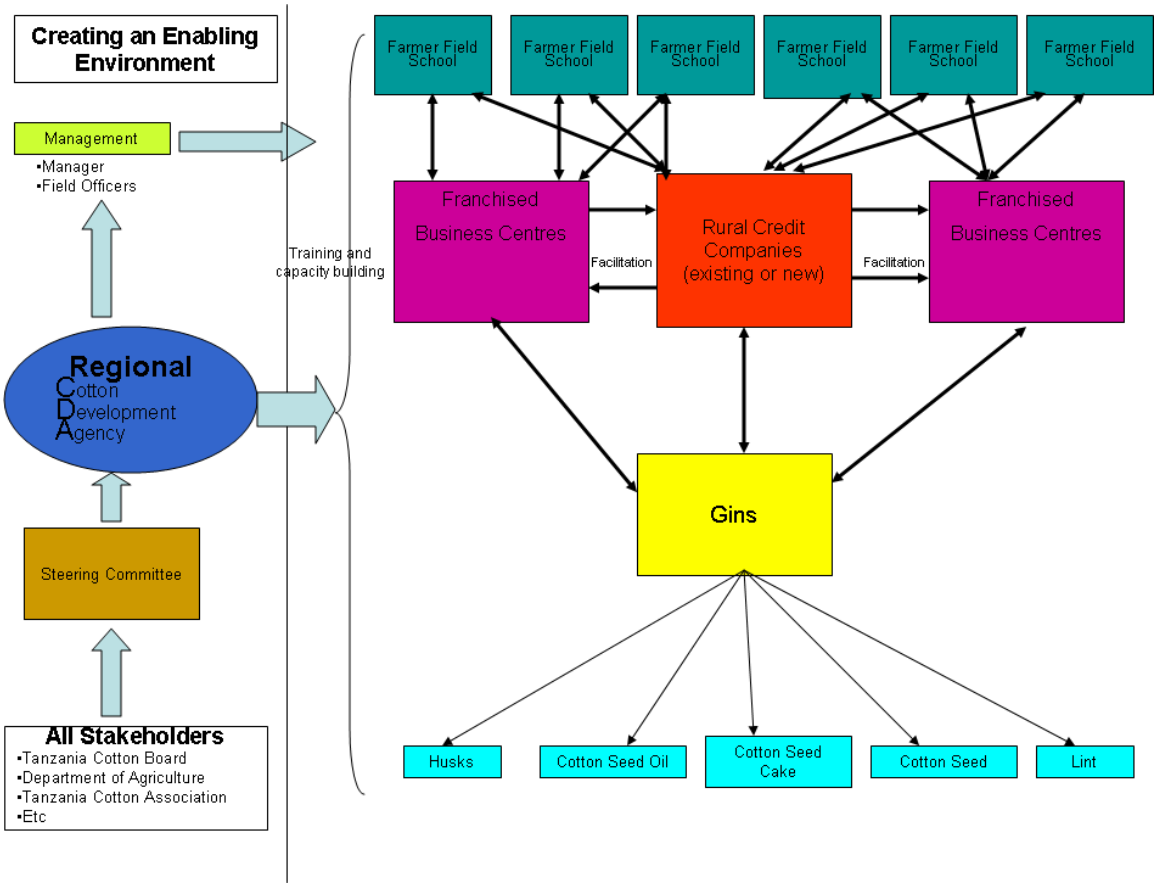
Farmer models were developed to test the financial viability of farmers using the improved technologies. The WCGA farmer growing cotton and sorghum has an estimated internal rate of return (IRR) over 20 years of 61%. The ECGA farmer growing cotton and maize has an estimated IRR over 20 years of 136%.

The capital outlay on a roller gin stand manufactured in Turkey is about US$4 500, which is a relatively manageable amount. A modern ginnery may have 30 or 40 such gin stands at full capacity. The main cost is for the bale press, which may amount to about US$60 000. Therefore, assuming that electricity reticulation is in reasonable condition, refurbishing a ginnery to full capacity using roller gins would cost a maximum of US$200,000. This is seen against a new three gin stand saw ginnery fully equipped with drawdowns, bale presses etc. costing between US$1.5m

and US$2m. A new roller ginnery of equal capacity fully equipped would cost in the region of US$750,000.

A business model of farmers linked to a cotton development agency was proposed following an investigation of different approaches to cotton development being tested in other African countries. The investigation looked at the advantages and disadvantages associated with a range of farmer groups; non-commercial, where production is mainly for home use; commercial; co-operative/association farming structures; and out-grower schemes. The study proposed that a Cotton Development Agency (CDA) should be established that is capable of accommodating the variety of development opportunities and business models. This development agency should have well trained staff with the capacity to oversee and facilitate all development opportunities outlined. This body must be capable of guiding prospective farmers in setting up farming businesses along sound development strategies. It should also have the capacity to give technical support. Farmers under the initiative must have access to inputs such as seed, fertilisers and chemicals for their annual farming operations. Access implies both availability of the inputs and the ability of farmers to purchase these inputs. In order to achieve this, most farmers require loan facilities for their input costs.

The Figure below shows the proposed organisational structure (simplified) of all the stakeholders and role players and the linkages between the relevant people and organisations for the proposed development.



Stakeholders, who attended the workshops held at Mwanza on 30 April and at Morogoro on 17 May 2007, expressed their support for the proposed demonstrations of improved production methods for cotton and food crops. The layout of the demonstrations was discussed and suitable localities were debated. The workshops decided that three districts in WCGA should have demonstrations, namely Geita in Mwanza region, Bunda in Mara region, and Kishapu in Shinyanga region. For ECGA, Morogoro region was selected with three districts chosen and to be short-listed later to three demonstrations each and laid out on farmer's fields with 2.5 acres per demonstration, made up of five plots of 0.5 acres assigned to the following: farmer practice food crop; farmer practice cotton; conservation agriculture food crop; conservation agriculture cotton; variety trail with food crop and cotton. Growing of the food crop and cotton would be rotated on an annual basis to help control insects and weeds. Maize would serve as the food crop in ECGA and sorghum in WCGA, because sorghum is considered more drought resistant.

The project staffing should rely on short-term specialists familiar with Conservation Agriculture (CA) methods for producing cotton and food crops of maize and sorghum, and green manure legumes. One CA specialist should be appointed on contract for implementing the demonstration in WCGA over the period mid-November to mid-December and another, or the same specialist, used in ECGA over the period mid-February to mid-March over a three year period. Follow up visits should be scheduled for WCGA over two weeks starting in the first week of February in WCGA and the first week of June in ECGA.

Local co-ordinators and other team members for the project should be drawn from staff on the pay roll of key stakeholder groups. A budget of US$18,000 per annum has been proposed for the travelling and accommodation costs for representatives of stakeholder groups. The TCB and TCA already have plans to promote the cotton sector through activities such as mechanisation services. TCB have senior officers stationed in the main regions producing cotton. The CA specialists should work closely with scientists from Ukirigura and Ilonga ARI. The cotton agronomist at Ukiriguru, Mr Robert Kileo had indicated a willingness to participate in the demonstrations in WCGA, and Mr Faraha Mrosso, entomologist at Ilonga ARI, has indicated a willingness to participate in the demonstrations in ECGA.

The workshop of stakeholders planned for September 2007 should be used as an opportunity to introduce the demonstrations and cotton development agency, and to call for steering committee members from cotton stakeholders such as TCB, TCA and TACOGA and input suppliers. It is proposed that TCB representatives could be drawn from TCB extension officers stationed in Shinyanga and Mara regions. The Extension Department of the Ministry of Agriculture, Food Security and Cooperatives was visited in Dar es Salaam in May 2007, and has expressed commitment to using their existing Farmer Field Schools (FFS) programme as a tool to rapidly disseminate the new production technologies to be used for the cotton and food crops.

It is proposed that the demonstration units will be done on farmers land with all input costs paid for by the project but with the income going to the farmer whose land is being used.

The projected revenue and production cost for the demonstrations is shown in the Table below:

Projected Revenue and Production costs of Demonstration Units

Year		Year 1	Year 2	Year 3
Revenue				
	Cotton (Improved)	1,013	1,351	1,689
	Maize/Sorghum (Improved)	1,158	1,351	1,544
	Cotton Existing	473	473	473
	Maize/Sorghum Existing	502	502	502
	Trials	579	579	579
	Sub-total	3,725	4,256	4,787
Production Costs				
	Cotton (Improved)	596	595	603
	Maize/Sorghum (Improved)	778	792	807
	Cotton Existing	187	187	187
	Maize/Sorghum Existing	132	132	132
	Trials	389	389	389
	Sub-total	2,082	2,096	2,118
Farm Gross Margin		**1,643**	**2,160**	**2,669**

The capital costs for the demonstrations would consist of the following:

Capital costs for the demonstration units

Item	No	Unit Cost ($)	Total ($)
Knapic AT No-till planter	1	2429	2429
Magoye ripper	1	457	457
Knapsack sprayer	3	93	279
Ulva Plus sprayer	3	171	514
V hoe+handle	3	9	26
Motor Cycle	1	5000	5000
Total for each region			8704
Total for four regions			34817
Vehicle for project			28000
Total			62817

In regard to overhead costs, it is envisaged that existing facilities of the TCB or Ministry of Agriculture, Food Security and Cooperative (MAFSC) will be used. The demonstration unit will require a project leader which will only be required during the critical periods and field officers who will undertake the day to day operations of looking after the demonstration plots. As mentioned above, these field officers could be existing staff of the TCB or the MAFSC. The overhead costs for 3 years are given in the Table below:

Overhead costs

Item/Year		**Year 1**	**Year 2**	**Year 3**
	Unit Cost/annum ($)			
Staff Salaries				
Project Manager (GAA)	50,000	50,000	50,000	50,000
Field Officer (EXISTING STAFF)				
Labour (included in gross margin				
Sub Total Salaries		50,000	50,000	50,000
Administration Costs				
Accounting Services	2,000	2,000	2,000	2,000
Research Trials	5,000	5,000	5,000	5,000
Insurance		2,000	2,000	2,000
Management/Consultancy Fee	80,000	80,000	80,000	80,000
Specialist Support Consultants (SSC)	60,000	60,000	60,000	60,000
Travelling and accommodation costs (SSC)	14,000	14,000	14,000	14,000
Travelling costs Stakeholders	18,000	18,000	18,000	18,000
Licences	1,000	1,000	1,000	1,000
Bank Charges	1,000	1,000	1,000	1,000
Telephone	6,000	6,000	6,000	6,000
General Maintenance		2,500	2,500	2,500
General Fuel (vehicle, tractor, etc)	36,000	6,000	6,000	6,000
Miscellaneous (5%)		1,975	1,975	1,975
Total Overhead Costs		**249,475**	**249,475**	**249,475**

The consolidated costs for the project are as follows:

Consolidated project costs

Item	**Year 1**	**Year 2**	**Year 3**
	(US Dollars)		
Production costs of demonstrations	2,082	2,096	2,118
Capital costs for demonstration units	62,817		
Overhead costs (salary & administration)	249,475	249,475	249,475
TOTAL	314,374	251,571	251,593

1 INTRODUCTION

Cotton is a lifeline of about 40% of Tanzania's population. In the 2005/06 financial year, cotton was the first forex earner among agricultural commodities (see box below, showing history of cotton in Tanzania). Sustainable cotton farming therefore has the potential to significantly contribute to poverty alleviation as well as to socio-economic development in the country.

Table 1: History of cotton in Tanzania

1884/85 – Carl Peters and other members of the Society for German Colinisation signed treaties with Africans in the hinterland of the Tanzanian coast, leading to the introduction of cotton, and other commodities such as sisal, rubber, coffee, copra, sesame and peanuts
.

1932 – Ukiriguru Research Station opened; the oldest research station in Tanzania. Conducts cotton research for the Western Cotton Growing Area (WCGA), covering the Regions of Shinyanga, Mwanza, Mara, Kagera, Tabora, Kigoma, Singida.

1943 – Ilonga Agricultural Research Institute established in Kilosa district, with the initial objective being to conduct cotton research towards improving production in the Easter Cotton Growing Area (ECGA), covering the regions of Manyara, Kilimanjaro, Tanga, Coast, Morogoro and Iringa. Later Ilonga-ARI embarked on research into food crops.

1952 – Tanganyika Lint and Seed Board formed by the British Colonial Administration, with the aim of marketing the cotton from Tanganyika (Tanzania).

1956 – Until this point in time ECGA produced more cotton than WCGA, thereafter WCGA became the leading production area.

1973 – Tanzania Cotton Authority (TCA) formed by and Act of Parliament, with the function of promoting the development of the cotton sector.

1976 – Co-operative Unions dissolved by Government and TCA took over control of the cotton sector value chain from production, buying seed cotton from farmers, ginning to the export of cotton lint.

1984 - Government reinstated the Regional Co-operative Unions (RCU) through the Tanzania Cotton Marketing Act No. 19 of 1984, which repealed the TCA and established the Tanzania Cotton Marketing Board (TCMB). The functions of TCMB were regulatory in nature, but included exporting of cotton lint on behalf of the RCUs.

1993 – Government liberalised the entire cotton industry as part of the on going economic recovery and structural adjustment programmes. This was followed by increased private sector involvement in seed cotton buying, ginning and lint exporting. The number of private buyers increased from 10 during 1994/95 to 54 during 2006/07. Today about 95% of cotton business is controlled by private companies.

1993 - Formation of the Tanzania Cotton Lint and Seed Board (TCLSB) by an Act of Parliament (Miscellaneous Amendment Act No. 11 of 1993. The TCLSB became the exclusive overseer of regulation of the cotton sector on behalf of the Government of the United Republic of Tanzania.

1999/00 - In this marketing season the Cotton Development Fund was established by TCLSB. A 3% levy on cotton exports is paid into a trust fund and used to finance purchases of cotton seed, chemicals and research and development

2001 – Government formed the Tanzania Cotton Board (TCB) through the Cotton Industries Act No. 2 of 2001. The TCB replaced the TCLSB, with increased functions, such as promotion of cotton production, stimulation of cotton research and extension, and the collection and dissemination of information on the cotton sector.

2005/06 – Peak cotton production season, with 694 107 bales produced, at a bale weight of 181 kilogram's (400 pounds), 78% of these bales were exported.

2006/06 – Cotton was the first forex earner among agricultural commodities.

In Tanzania, cotton is grown in 13 regions out of 21, under rain-fed conditions. It is estimated that cotton is grown on about 300,000 to 400,000 hectares by up to 500,000 smallholder farmers, with limited use of purchased inputs. The number of farmers growing cotton fluctuates between 350,000 and 500,000 depending on producer price paid in the preceding season, weather patterns and competitiveness of cotton against other crops. The average yield is about 750kg of seed cotton per hectare. All the cotton varieties grown in Tanzania belong to the American upland type, *Gossypium hirsutum* L.

1.1 Purpose of study

The purpose of the study is to develop strategies that will firstly result in a 333% increase in on-farm cotton yields (from 750kg/ha to a target of 2,500kg/ha by the year 2015) and secondly, to increase incomes along the whole value chain for cotton, and in particular to investigate potential competitiveness of Tanzania with regard to spinning, weaving and apparel manufacturing, in order to reduce the high proportion of cotton lint which is exported. It is important that the report should not be purely of academic value.

The main objective of the study is to develop a strategy to improve the efficiency and cost effectiveness of all segments of the cotton value chain in Tanzania, with a view to determining Tanzania's comparative advantage in the global cotton and textile market and how this position can be fully realised.

A specific objective for the team dealing with field production of cotton through to ginning and value adding to ginnery by-products, is to formulate intervention points where changes in current practices can be introduced to increase profitability of the farmers and ginners.

1.2 Methodology and participants

Various meetings were held with representatives of Tanzania Cotton Board, Tanzania Cotton Association (in particular the TCA Workshop at Mwanza over 14-15 May 2007), the Agricultural Research Institutes (ARI) at Ukiriguru and Ilonga, relevant Departments of the Ministry of Agriculture, Food Security and Cooperatives and input suppliers in order to

discuss constraints and challenges to cotton production in Tanzania. The meetings at the ARI included information gathering to review the status of cotton research against world technological advancements, strengths and weaknesses in the dissemination of cotton production knowledge and a needs assessment for the ARI in order to facilitate sustainable service delivery.

Various models of credit and input supply for cotton farming were investigated. Modern cooperatives or other legal entities were considered with a view to increasing farmer share in profits arising from the value chain.

2 TANZANIA COTTON PRODUCTION AREAS AND THEIR RESOURCES

2.1 Cotton production areas

Cotton is grown by small-scale farmers in many parts of the Tanzania mainland, with more than 95% of the crop grown in the Western Cotton Growing Area (WCGA) which comprises the seven regions Shinyanga, Mwanza, Mara, Kagera, Tabora, Singida and Kigoma. The remainder of the crop is grown in the Eastern Cotton Growing Area (ECGA), which comprises of Manyara, Kilimanjaro, Tanga, Coast, Morogoro and Iringa regions. Production in ECGA and is centred in the Morogoro region.

2.1.1 Share of seed cotton production by area

Up to 99% of the production comes from the WCGA. Levels of production attained during 2004/05 and 2005/06 surpassed the production of 532,440 bales recorded just before liberalisation during the 1992/93 season.

The main regions involved in cotton production are Shinyanga and Mwanza, as shown in Table 2 below:

Table 2: Seed cotton production by regions (tons)

Seed cotton production by regions 1991/92 to 2006/07 (16 years)																	
Zone	Region							Season									
		1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
WCGA	Shinyanga	112,866	123,056	60,588	38,209	103,879	111,299	112,172	50,733	57,466	69,913	80,030	119,107	88,352	204,626	234,193	82,740
	Mwanza	85,551	108,313	53,034	54,250	54,153	82,700	62,791	35,794	31,551	41,376	46,685	43,681	31,296	90,974	91,871	28,087
	Mara	30,333	23,558	11,945	17,289	31,968	26,918	7,594	6,136	2,822	4,286	13,091	11,361	11,296	24,128	28,288	4,734
	Kagera	6,838	6,125	3,615	2,867	7,212	6,822	3,751	3,390	431	2,087	3,117	1,613	3,476	7,091	14,197	1,992
	Tabora	14,429	17,011	7,819	5,151	12,328	11,898	9,864	3,567	4,757	5,725	4,613	11,409	4,332	10,560	5,089	9,997
	Kigoma	314	553	216	203	343	167	52	55	15	4	18	28	62	542	697	208
	Singida	2,118	3,095	1,904	771	2,767	1,568	1,482	386	-	27	21	8	39	481	484	507
	Mean Total	252,449	281,711	139,121	118,740	212,650	241,372	197,706	99,961	97,042	123,291	147,575	187,147	138,904	338,402	374,819	129,265
	%	94.6	91.4	94.2	94.5	96.2	96	98	94	97	99.8	99.6	99.6	99.3	98.1	100	99
ECGA	Manyara	1,426	604	141	33	51	81	62	248	6	6	130	120	224	829	781	404
	Morogoro	5,945	14,028	1,163	401	1,455	2,389	952	334	35	35	242	347	523	1,948	875	849
	Mbeya	5,089	7,497	6,885	5,536	5,842	7,437	3,154	5,062	2,934	-	-	-	-	-	0	0
	Kilimanjaro	211	2,214	184	240	360	58	17	15	4	4	21	20	29	26	6	11
	Coast	1,239	13,366	118	239	361	50	29	48	8	8	9	86	83	190	45	12
	Tanga	597	758	117	241	412	383	297	93	89	89	15	61	49	140	58	41
	Iringa	0	87	8	4	17	6	-	92	25	29	150	102	17	54	7	0
	Mean total	14,507	26,554	8,616	6,694	8,498	10,379	4,511	5,892	167	171	567	736	929	3,187	1,772	1,317
	%	5.4	8.6	5.8	5.5	3.8	4	2	2	0.2	0.2	0.4	0.4	0.7	1.9	0.5	1
	Grand total	268,956	302,956	147,737	125,434	221,148	251,751	202,217	105,853	123,558	123,589	148,142	187,883	139,829	341,789	376,591	130,582
Shinyanga + Mwanza %		73.8	76.4	76.9	73.7	71.5	77.1	86.5	81.7	72.0	90.0	85.5	86.6	85.6	86.5	86.6	84.9

2.2 Resources of the cotton production areas

The ECGA has greater potential for increased cotton production than WGCA which, due to continued cultivation coupled with inadequate use of fertilisers, has soils which have generally become too exhausted to produce a productive crop.

After high production levels in 2005/06 season, production dropped in the 2006/07 season due to drought. In this season, cotton was produced by some 350,000 small holders on an area of 560,000 ha. The majority of small holders produce cotton on areas less than one ha in size, and production varies from 500 to 750kg seed cotton per ha.

In the northern areas of WCGA rainfall is high (over 1,000mm) and cotton is produced on about 0.5 ha in the rotation on light sandy soils. In the southern areas of WCGA rainfall is lower (about 750mm) and the crop is produced on about 1.5 ha in the rotation on heavier soil. Rotations tend to be haphazard i.e. after cotton has been grown for a few years when soil fertility has been depleted, it may be replaced by other food crops. In the ECGA farms are small (0.22 ha) and cotton may constitute 40% of this area.

2.2.1 Soils

The soils of Tanzania strongly reflect rainfall patterns across the country, with soils in the drier western and central “rain shadow” area having near neutral pH, and relatively high levels of exchangeable calcium (Ca), magnesium (Mg), potassium (K) and sodium (Na), whereas the soils in the higher rainfall eastern parts are more deficient in these exchangeable elements through leaching, and in the very high rainfall and elevated positions of the landscape have acid sub-soils, and high saturation of the cation exchange capacity (CEC) by aluminium. The soils in the drier areas have low organic matter levels. The interior plateaux are covered with red and yellow tropical loams of moderate fertility.

The Ministry of Agriculture, Food Security and Cooperatives has an excellent computer website housing soil, agro-ecological and crop suitability maps for the country. The website is managed by the ARI- Mlingano, which is located 15km from Muheza town on the highway to Tanga. Appendix B contains two maps of soil types extracted from the database, one for Bunda district in the WCGA and the other for Kilosa district in the ECGA. The key to each map shows highly useful land capabilities and management notes for each soil type.

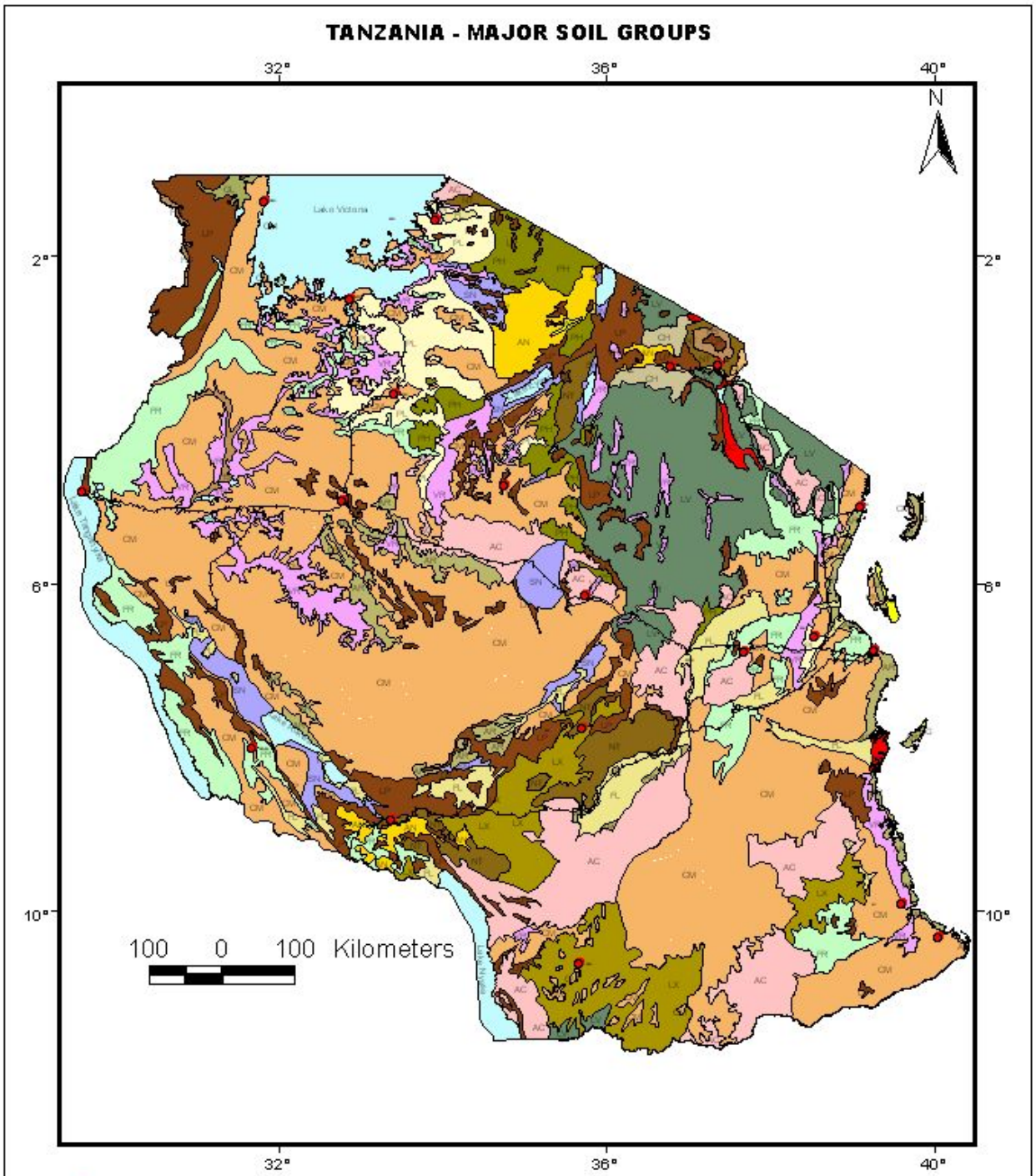
Figure 1 below shows the major soil groups for Tanzania. The transparent overlay shows the main cotton growing areas in the WCGA and ECGA. Cambisols are the most extensive soils in Tanzania and are also the dominant soil group used for cotton. Cambisols cover 36% of the country. They occur mainly in the mid-western and south-eastern parts of the country. FAO coined the name `Cambisols'; USDA Soil Taxonomy classifies these soils as `Inceptisols'. Cambisols are soils with beginning of horizon differentiation evident from changes in colour, structure or carbonate content; named from Latin *cambiare*, to change. The parent materials of Cambisols are medium and fine-textured materials derived from a

wide range of rocks, mostly in colluvial, alluvial or aeolian deposits. Cambisols are characterized by slight or moderate weathering of parent material and by absence of appreciable quantities of illuviated clay, organic matter, aluminium and/or iron compounds.

Cambisols make good agricultural land and are intensively used. The Eutric (little leached) Cambisols are among the most productive soils on earth. The Cambisols, though less fertile, are used for mixed arable farming and as grazing land. Cambisols on steep slopes are best kept under forest; this is particularly true for Cambisols in highlands. Eutric and Chromic Cambisols in undulating or hilly (mainly colluvial) terrain are planted to a variety of annual and perennial crops or are used as grazing land. Ferralic (rich in iron and aluminium oxides) and Rhodic (red coloured, due to presence of iron oxides) Cambisols in the more humid areas are poor in nutrients. Cambisols in alluvial plains make productive `paddy soils'.

The soils of the Tanzania are generally deficient in phosphorus and nitrogen and will benefit from additions of synthetic fertilisers or animal manures. Deficiencies of all macro-elements are likely to result after a number of years of cotton production without nutrient additions through fertilisers or manures. Crop rotations with legumes having nitrogen fixing rhizobia should help to improve N fertility in areas where rainfall exceeds 800mm, where the legumes can be grown as short duration fallow crop inter-seeded into maturing food crops such as maize or sorghum, or as sole crops, with crop residues retained on the soil surface following harvesting of seed. The rhizobia organisms in the root nodules of certain legumes can fix atmospheric nitrogen and convert it to an available form for the host plant. Examples of suitable legumes are velvet bean (*Muchuna pruriens*) or pigeon pea (*Cajanus cajan*), as short duration fallow crops.

Cotton is sensitive to low pH and the acid soils in parts of ECGA will need liming to reach full potential.



Map code	Major soil group	Sq km	Percent
AC	Acrisols	81642.50	8.63
AN	Andosols	15904.46	1.68
AR	Arenosols	21926.33	2.32
CM	Cambisols	337353.69	35.64
CH	Chernozems	4734.96	0.50
FR	Ferralsols	59852.62	6.32
FL	Fluvisols	26223.13	2.77
GL	Gleysols	1486.19	0.16
HS	Histosols	3791.45	0.40
LP	Leptosols	76738.02	8.11

Map code	Major soil group	Sq km	Percent
LX	Lixisols	46888.61	4.95
LV	Luvisols	68706.15	7.26
NT	Nitisols	21001.11	2.22
PH	Phaeozems	22190.10	2.34
PL	Planosols	28197.84	2.98
RG	Regosols	1196.15	0.13
SC	Solonchaks	2750.92	0.29
SN	Solonetz	19626.46	2.07
VR	Vertisols	47497.85	5.02
Water bodies		58836.73	6.22

Figure 1: Soil groups of Tanzania

2.2.2 Climate

The climate of Tanzania is generally favourable for cotton production at all elevations below 400m a.m.s.l, with the near equatorial latitudes of the country having favourable temperatures throughout the year, and greater than 650mm means annual precipitation (MAP) in most regions, which is the minimum rainfall required for rain-fed cotton production. Rainfall is variable, both from place to place (as shown in Figure 2) and time to time, and is generally lower than might be expected for the latitude. About 21% of the country can expect with 90% probability, more than 750mm of rainfall and only about 3% can expect more than 1,250mm.

The central third of the country is rather dry (less than 500mm) with evaporation exceeding rainfall in nine months of the year. For much of the country, most rain falls in one rainy season, December-May, though two peaks of rainfall in October-November and April-May are found in some areas. Apart from the problem of the long dry season over most parts of the country, there is also a marked fluctuation in annual rainfall from one year to the next, and this may be reflected in the crop production and livestock figures.

The WCGA has predominantly unimodal rainfall, with optimum planting dates ranging from mid-November to mid-December. The mean annual rainfall in the WCGA is about 1,100mm in Mwanza region decreasing in a south-easterly direction to about 750mm in the heart of the Shinyanga region. In the ECGA, rainfall is unimodal with a tendency towards bi-modal, with a range of rainfall from about 700mm in drier valleys to as high as 2,000mm means an annual rainfall in some east (sea) facing highland areas. The optimum planting dates in the ECGA are from mid-February to mid-March.

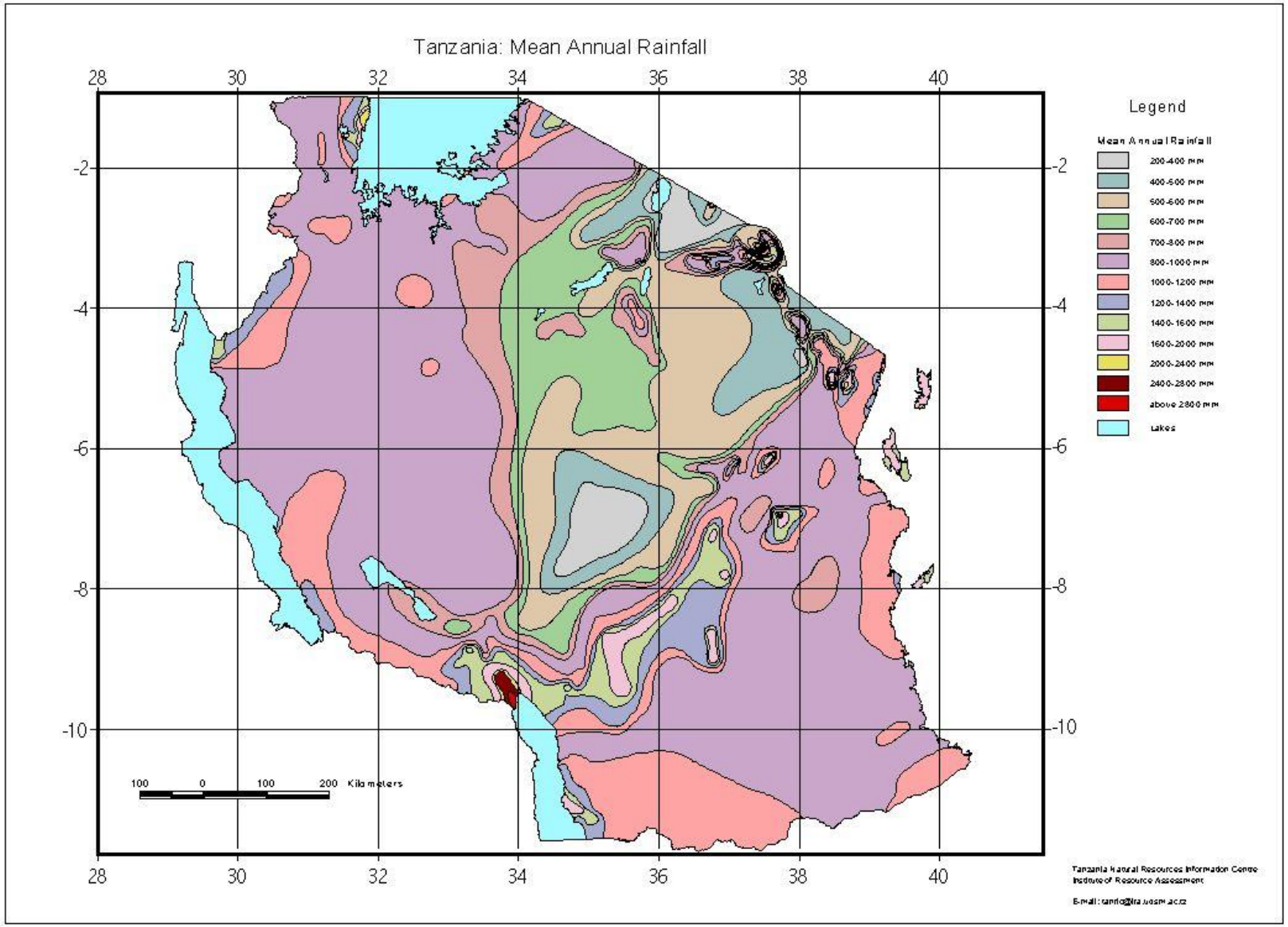


Figure 2 Tanzania mean annual rainfall

2.2.3 Infrastructure, including ginneries and their capacities

The cotton growing areas have good main roads with asphalt laid on a good foundation. However, secondary roads are showing a need for maintenance, and tertiary roads are very poor. The TCB's strategy is to encourage seed cotton buying posts within a maximum distance of 8km from farmer fields. Since the majority of cotton is produced by smallholder farmers, who deliver their cotton to buying posts on foot, bicycle or ox cart, the poor roads are not considered a major problem for the farmer. The poor tertiary and secondary roads obviously impact on moving seed cotton from the buying posts to the ginneries.

TCB and TCA have plans to encourage mechanisation services for farmer's, initially for land preparation, and moving tractors with implements will be hampered by the poor condition of the tertiary roads linking the villages to the farms.

Very few rural villages have electricity supplied from the National grid. This situation will restrict any attempts at decentralising add value processing. Fossil fuels in Tanzania are expensive and on a par with other countries that import refined automotive fuels, which will make large-scale electricity generation using fuel powered motors uncompetitive.

As mentioned below under Stakeholders - ginners, many union ginneries are over 30 years old and completely run down. Tanzania has 77 ginners, with 33 of these currently active (2006/07 figures), with ginning increasingly being done by private companies who are investing in modern roller gins. The capital outlay on a roller gin stand manufactured in Turkey is about US$4,500, which is a relatively manageable amount. A modern ginnery may have 30 or 40 such gin stands at full capacity. The main cost is for the bale press which may amount to about US$60,000. Therefore, assuming that electricity reticulation is in reasonable condition, refurbishing a ginnery to full capacity using roller gins would cost a maximum of US$200,000. This is seen against a new three gin stand saw ginnery fully equipped with drawdowns, bale presses etc., costing between US$1.5m and US$2m. A new roller ginnery of equal capacity fully equipped would cost in the order of US$750,000.

The estimated total capacity of existing ginneries in Tanzania is about one million bales. About 70% of this capacity was utilised in the peak production year of 2005/06, with 694,107 bales of lint produced.

2.2.4 Stakeholders involved in the Cotton Sector

Cotton farmers

It is estimated that in Tanzania cotton is produced by about 500,000 smallholder farmers. Farms are small, mainly in the order of 2–5 acres. Farm sizes are larger in the drier areas. Food crops are given priority, such as rice and sorghum in the WCGA, and maize and subtropical fruits in the ECGA. Food crops are produced on about 60% of the farmer's land, with the balance of about 40% allocated to cotton. All farming is labour intensive, with insecticides being the only purchased input for cotton.

Tanzania Cotton Board (TCB)

The origins of the Tanzania Cotton Board can be traced from 1952 when the Tanganyika Lint and Seed Board was formed by the British Colonial Administration with the aim of marketing the cotton from Tanganyika. The subsequent events in the history of the Tanzania Cotton Board can be found in Table 1 under the Introduction, section 1, with following milestones:

- 1973. Formation by government of the Tanzania Cotton Authority (TCA)
- 1984. Formation by government of the Tanzania Cotton Marketing Board (TCMB)
- 1993. Formation by government of the Tanzania Cotton Lint and Seed Board (TCLSB)
- 2001 Formation by government of the Tanzania Cotton Board (TCB).

The TCB is the arm of government to regulate the cotton industry. TCB regulates the industry through the formulation of regulations for cotton cultivation, marketing, processing, importation, exportation and storage of seed cotton and lint. Additional regulatory functions are issuing of permits and licenses to buyers of seed cotton, exporters of cotton lint, operators of ginneries and in determining the qualifications for granting such permits. Additional functions are to promote growth of production, processing, quality, marketing and export of cotton, stimulation of cotton research and extension, and the collection and dissemination of information on the cotton sector. The TCB advises Government on all matters affecting the cotton industry, and promotes the establishment of associations of stakeholders.

Tanzania Cotton Association (TCA)

The TCA was established in 1997. The primary functions are; to clarify, represent, defend and forward the interests of its members in the overall goal of cotton sector development. It also compliments the activities of TCB by certifying documents and providing dispute-resolution mechanisms. The TCA provides its members with information on the cotton sector, such as government policies affecting the cotton value chain.

In practice, TCA has remained largely an association of ginners, traders, exporters; and was lately (2006) formally joined by growers through the Tanzania Cotton Growers Association (TACOGA). Currently TCA has 43 members, of which 35 are ginners; one exporter; four cooperative unions; one grower's association; and two farmers.

Co-operatives

Following liberalization in 1993, the contribution of cooperatives in cotton buying has fallen from 100% in the 1980s and early 1990s to 10% in 2001/02 marketing season. However, the regional unions are still the major owners of a large number of ginneries, many being over 30 years old and completely run down. The primary societies which support the co-operatives are gradually being phased out.

Currently, there are four cooperative unions.

Private sector (buyers, ginners, exporters)

After liberalisation of the cotton sector, the number of private buyers has increased from 10 in 1994/95 to 54 during the 2006/07 season. The proportion of seed cotton bought by private buyers has increased from 9% to 95% during the same period.

The union ginneries are increasingly being leased by private companies as an entry point into the cotton ginning business. Once established, these new ginners tend to purchase their own ginning equipment.

Cotton oil millers

Almost all seed cotton, except for a small proportion of seed cotton reserved for planting, is used for crushing to produce cooking/edible oil. Many ginners are also oil millers. Currently 30 ginners have installed oil mills at their business premises, capable of processing 16,121m of cotton oil; representing only 14% of installed capacity which stands at 115,150m per annum. Two additional oil mills are under construction by Kahama Cotton Co Ltd and Nyakabindi. These oil mills also produce around 52,000 tons in total of cotton cake annually.

The oil produced is mostly washed oils of low grade that do not meet the edible oil national standards. Thus there is a need for improving the oil industry to attain double refined seed oil standards in order to gain competition against imported edible oils.

Cotton textile manufacturers

The textile industry in Tanzania is poorly integrated into the cotton value chain, and currently consumes only about 30%of lint. The recent TCA workshop held in Mwanza over 14 – 15 May 2007 raised the importance of attracting members from Tanzania's textile industry so that they can become more active, better informed and a stronger link in the value chain.

3 CURRENT PRODUCTION AND GINNING PRACTICES

3.1 Methods of production

3.1.1 Land preparation

Land preparation is mainly by hand using hoes, where the surface soil is cut and inverted as a weed control exercise, and to prepare a seedbed. In some areas, for example the Shinyanga region, animal traction is used for ploughing the soil using a beam to which a single mouldboard bottom is attached. Where animal traction is available, interow cultivation may also be done for weed control shortly before seeding ridges may be formed at about 1m spacing, also done by hand. Ridges follow the contour (i.e. horizontally) as a means of controlling soil erosion, with cotton planted on the ridges. Farmers have observed that ridges are a suitable way of preventing topsoil erosion on sloping ground.

Ridges are broken down by hand hoe after harvest of cotton. Hand hoes are used to remove the cotton, which are gathered together and burned.

Members of TCA, mainly ginners, have recently grouped together to import 100 tractors of 54kw engine power rating from India. There is a strategy to offer mechanisation services at cost to farmers in the ginnery supply area as a means of increasing cotton yields.

3.1.2 Seeding

Seeding is done by hand using hoes. A planting hole (station) is formed every 40cm, into which is placed five seeds, and when available a handful of manure placed a couple of centimetres away from the seed. Thinning to two plants per station is done about three weeks after planting.

3.1.3 Fertilisers

Fertilisers are rarely used by the smallholder farmers. The reason is poor access to credit. A 50kg bag of urea may cost about Tsh 40,000 (about $32). A country norm for urea purchased in bulk should be about 24 US cents per kilogram. Small purchases attract a premium.

3.1.4 Weed Control

Weed control is done by hand using hoes. Green ridging, or earthing-up of soil on both side of the cotton rows to form a ridge, is done during weed control.

Farmers should weed their fields at least three times in the growing season to achieve a good crop of cotton. In reality, priority is given to looking after the food crop such as cassava, maize, rice or sorghum, with the cotton neglected and thinned late and infrequently weeded.

Assuming that weeds were well controlled during seedbed preparation the three weedings should commence at week four or five after planting and then done at four week intervals until the crop has developed a canopy sufficient to shade the soil and prevent further weed growth. Thereafter, spot weeding will be required to remove the odd large weed.

Well managed farmer fields were observed in the Mwanza area in May 2007. These fields had been planted to the variety UK91, in rows 1m apart and thinned to the correct plant stand giving a population of about 50,000 plants/ha and using cattle manure to improve soil fertility. The estimated yields were between 2,500 and 3,000kg of seed cotton per hectare, based on number of bolls per plant and plant population density taken from randomly samples plants in the field. This indicates that there is potential for good yields using the cotton varieties developed at the research station at Ukiriguru, serving the WCGA.

Weed competition in cotton is perhaps the single most important cause of yield reduction in cotton and can result in 40-80% yield loss. Weed pressures tend to be greater in the Eastern Cotton Growing Area (ECGA) than in the Western Cotton Growing Area (WCGA). Research has shown losses of up to 80% due to weed competition in the ECGA and up to 50% in the WCGA.

In the northern areas of the WCGA on the sandy soils grasses (in particular Cynodon sp.) and water grass (*Cyperus* sp.) are important weeds, whilst in the heavier soils of the southern areas broadleaf weeds and water grass constitute the most common weeds. In the ECGA water grass and grasses (especially *Brachiaria* sp.) are the most important weeds.

Timely weeding is essential to prevent competition for nutrients and moisture and is especially important in the first 6-8 weeks after crop emergence and the land at planting should be weed free. Cynodon being a common weed should be carefully removed by hand-hoeing. Cotton is planted in the ECGA in February and mid-November to December in the WCGA. In both areas weeding should commence approximately 30 days after germination and should coincide with thinning of the crop. In the WCGA, three weedings are generally necessary, whilst up to four weedings may be needed in the ECGA.

The second weeding is necessary approximately two months after crop emergence and the third should be done a month later. A fourth weeding being necessary in the ECGA to control late germinating weeds.

Most cotton fields observed were relatively free of weed and weeding appears to be well accepted by farmers. Weeding is most commonly done by hand. Hand-hoeing is practiced

by most farmers, whilst ox-drawn weeding is done by few farmers. No herbicides are used or registered for use, but research on these is being conducted at the cotton research station at Ukiriguru and Ilonga. Total man days for each hand weeding operation are 1.5-3 days per acre.

3.1.5 Insect and Disease control

Introduction

Insect damage to cotton is considered to have a potential of reducing yield by 40-50%. The insect presence in the ECGA is greater than in the WCGA. The crops are planted in February in the ECGA and between mid-November to December in the WCGA. The major pests in both areas are similar and are listed below:-

American bollworm	-	*Helicoverpa armigera*
Spiny bollworm	-	*Erias insulana*
Aphids	-	*Aphis gossypii*
Stainers	-	*Dysdercus sp*.
Cotton blue bug	-	*Calidea sp*.

Other pests of lesser importance include:-

Pink bollworm	-	*Pectinophora gossyprella*
Jassids	-	*Empoasca sp*.

Note: Red bollworm (*Diparopsis castanea*) is not listed as a pest in Tanzania, as it is presently isolated from the country by a quarantine area south of the Matandu River, where cotton growing is prohibited. This prevents the entry of this pest from Mozambique, as it can only survive on cotton and wild cotton hosts.

Other pests including loopers, leaf miners, white fly, thrips and red spider mite are not considered to be of economic importance.

Diseases

The main diseases of importance in Tanzania are:-

Bacterial blight	-	*Xanthomonas campestris pv. malvacearum*
Fusarium wilt	-	*Fusarium oxysporum*
Alternaria leaf spot	-	*Alternaria* sp.
Seedling diseases	-	Various

Beneficial organisms will be listed as they play a role in reducing or restricting pest levels especially in the period before the application of insecticides. They therefore are important in integrated pest management (IPM).

These include:-

Lacewing larvae	-	feed on insect eggs and aphids
Ladybird larvae	-	feed on insect eggs and aphids
Spiders	-	feed on young insect larvae
Parasitic wasps	-	attack and kill various insect larvae
Virus diseases	-	attack and kill various insect larvae

Pest identification and brief life cycles

American Bollworm

The major insect pest of cotton in Tanzania and one that accounts for the most damage to cotton caused by all insects. It has numerous hosts including other rotational crops. The pest may attack cotton in the early season, when eggs are generally laid on the upper third of the cotton plant. The eggs are creamy in colour and darken with age until they hatch after three days. Eggs are approximately 0,5mm in size. The young larvae are dark in colour and develop to bright green to black with age and have a characteristic whitish stripe along their sides. Larvae feed on buds, squares, flower and bolls, often puncturing these and move on to damage many of these in a relatively short period. Damaged squares show typically as flared squares with a clean punctured hole, and are shed from the plant resulting in serious yield loss. Larvae live for 2-3 weeks, where after they pupate in the soil at a depth of 170-180mm. The pupal stage takes about 14 days.

Spiny Bollworm

The female moth lays about 200 small blue to green coloured eggs over the whole plant, but are found mainly on buds and young bolls. Eggs are difficult to find and hatch after three days. The larvae feed on the soft tissue of apical buds, squares and bolls and often cause side branching of the plant. Larvae are a mottled brown in colour with characteristic fleshy protuberances on each segment (spines). Pupation takes place on the plant and lasts about 14 days.

Aphids

Cotton aphids may develop large populations on cotton in a short period of time, especially during dry periods and following insecticide application which kill their predators. They feed on sap of young shoots, leaves and growing tissue, causing leaves to curl. Young aphids can produce young after 5-6 days and it is for this reason high populations can develop in a short time. Sugar not required when feeding is excreted as honey dew and show up as shiny deposits on leaves. These form a substrate for sooty moulds, and can restrict respiration, photosynthesis and plant growth in general. Honey dew may also be excreted on cotton fibres where it discolours the lint and negatively affects the ginning.

Stainers

Cotton stainer feed mainly by sucking the sap from cotton seeds of developing bolls and this induces boll drop of young bolls through the transmission of a fungus. They also cause

staining of the lint of older bolls. Stainers are late season pests during boll opening. Adults are brightly coloured reddish bugs with orange or black dots on blackish wings. They are endemic and survival depends on cultivated cotton, other closely related plants and baobab trees. When cotton residues are removed, they can over winter in cracks in the soil.

Cotton Blue Bug

This is a metallic blue to green black bug. They can be quite mobile and capable of flying some distance. They often migrate from alternate host such as sorghum and sunflower to cotton fields after boll formation. These feed on cotton seed from outside the boll causing symptoms similar to stainers.

Cotton Diseases

Seedling Diseases

These include seed decay which occurs shortly after planting and destroys the seed before germination. Damping-off infects primary roots soon after germination often causing growth to stop before emergence. The disease can also affect growth of young seedlings after emergence.

Bacterial Blight

The disease may occur as Angular leaf spot, Black arm or Boll rot. Angular leaf spot develops as small, angular and water soaked lesions on the underside of leaves. These lesions may enlarge and, necrosis, angular brown spots develop on the upper leaf-surface. Severely infected leaves are shed. The bacteria may also result in boll rot and weaker cotton lint.

Black Arm

The leaf-stem becomes black, hangs downwards and leaves are shed.

Boll Rot

Shows as round water soaked lesions on bolls. These may enlarge and become sunken. The bacteria may produce slime, which stains and weakens the lint. The bacteria can reduce stand, yield and lint quality. Primary dissemination is through contaminated seed and cotton debris. Secondary dissemination is through wind, rain and to a lesser extent, workers, insects and implements. The disease is important in the southern part of WCGA.

Fusarium Wilt

An important disease in the northern part of WCGA. It is both seed and soil-borne and can survive in soils for up to five years. It causes wilting of whole or parts of plant, yellowing and shedding of leaves, stunted growth and in later stages senescence. A cross-section cut of the stem near the base of the plant shows as a brown ring near the bark.

Control of Insect Pests and Diseases

An integrated pest management (IPM) approach is often used as an approach to control of pests and diseases by combining

- cultural methods (rotations and weeding)
- resistance
- sanitation
- chemical

Cultural Control

Cotton should be grown in rotation with cereal crops and legumes to reduce bacterial blight incidence in the soil. With *Fusarium* infections, cotton should not be grown in infected areas for at least five years.

Rotations tend to be haphazard, and after a few years of cotton in the same field, yields tend to decline with the depletion of soil fertility. At this stage, farmers change to other crops.

Resistance

In the WCGA, the planting of UK82 was used in the southern areas as it was bred specifically for its resistance to bacterial blight, whilst UK77 was commonly planted in the northern areas because of its resistance to *Fusarium* wilt. However, in recent years these two varieties have become mixed and resistance has broken down with resultant drop in yield. UK91, with resistance to both diseases, is now replacing both varieties in all the WCGA.

In the ECGA diseases are not regarded as a problem and the variety ALAI 90 is grown.

In general, diseases are controlled using resistant varieties and rotations, whilst the use of acid delimited seed would assist the control of seedling diseases. However, as there is no acid-delinting the use of bactericide seed dressings are used to control seedling diseases.

Chemical Control of Insect Pests

A list of all insecticides registered for use in Tanzania is appended in Appendix A. All these have been evaluated in research stations at Ukiriguru and Ilonga over a three year period before registration by the Tropical Pesticides Research Institute (TPRI) in Arusha. It would appear that the product endosulfan, although registered, is no longer used. This is unfortunate as the product is less harmful to pest predators than the other registered insecticides. These comprise synthetic pyrethroids, which are highly effective in controlling pests, but are also harmful to beneficial insects that predate on pests.

Insecticides are generally supplied by chemical companies through the TCB and are applied in the form of acre or A-packs suitable for use by farmers. A farmer purchases the insecticides using the passbook system. This involves the stamping in the official passbook

(held by the farmer), recording the cotton seed he sells. At the start of the following season, the farmer is entitled to claim seed or insecticides up to the value recorded in the passbook. This system represents a form of "forced saving" since the farmer is not paid out the full value of the cotton he sells. The cotton he sells in one season entitles him to receive the quantity of inputs (insecticide or seed and is proportional to the value of cotton sold), during the following season. For most farmers, the passbook system of purchasing insecticides does not satisfy the quantities that are required for optimum pest control. In general, it covers the cost of one or two sprays. A minority of farmers pay cash for the chemical input. Sales are made at a buying post in villages.

In the past, oil-based insecticides were purchased by Cotton Development Fund (CDF) through tenders with private chemical companies. These were ultra-low-volume (ULV) sprays suitable for application using ULV spraying equipment. However, more recently lower-priced water-based sprays were introduced. These required new sprayers suitable for this type of spray and may be a reason why there was an initial decrease in chemical spraying. However, this problem now appears to be resolved. These water-based sprays are suitable for application using ULV plus and knapsack sprayers.

Note: Chemicals are purchased by farmers largely through village intermediaries (buying posts), the balance bought through stockists, cotton company agents, and through the extension agent, or primary societies. (Unpublished data for World Bank, March 2007).

Spray Application

ULV sprayers were initially used to apply oil-based ULV insecticides in spray volumes of 2.5-5.0 Lt/ha. However, when there was a change to water-based insecticides, because of their lower cost, these had to be applied using the ULV plus sprayer or knapsacks. ULV plus sprayers employ a spinning disc to form droplets and spray volumes of 5-10 Lt/ha are applied. The droplet size emitted is approximately 100-130um in size, which are slightly larger then the oil-based ULV sprays. This allows for some evaporation of droplets, but recovery on to plants is considered to be satisfactory. The sprayer operates using 5 "D" sized batteries. Some farmers have mentioned that the cost of batteries to be an additional expense. It is perhaps for this reason that some farmers use knapsack sprayers applying 110-150lt of spray per ha. The ULV plus sprayers are held approximately 0.5-1,0m above the crop and sprays are carried downwind onto the crops. Initially four-rows are sprayed and this is reduced progressively to two-rows as the crop grows taller. As the spray is carried downwind to the crop, there is less spray-contamination to the operator.

The number of sprays applied tends to be erratic and may range between 1-6 sprays per field. The number of sprays is largely governed by cost of insecticides and most farmers apply about three-sprays. Commencement of spraying is often 10 weeks after germination and is frequently done at 14-day intervals (calendar basis). The spray period continues up until boll-burst. This would require about six sprays. Cotton scouting has been introduced as calendar spraying is not economic and does not take into account varying pest pressures in the field. For this reason, calendar spraying as described above is not commonly

practiced. Scouting, developed by the research stations, takes into account fallen squares as an indicator for spraying. This can be misleading as squares also fall from plants as a result of moisture stress. Scouting "punctured" flared squares with a hole is a more correct indicator of damage young bollworm larvae. The farmer walks diagonally across his field and examines 15 plants at random. He then repeats this along the second diagonal, examining a total of 30 plants. At each stop, the farmer counts the number of flared squares with holes, (squares with open bracts) on plants. The threshold for spraying has been set at 0.5 flared squares with holes, per plant - or 15 flared squares per 30 plants per field. Scouting should be repeated weekly, commencing at flowering to boll-split. Ideally the field should be re-checked 2-3 days after spraying to check the effectiveness of sprays.

In the WCGA, where there is a lower insect pressure than ECGA, three sprays may be necessary for good control of insects. The spray programme in ECGA is similar to the WCGA, but 3-4 sprays may be required for good control. In both areas late season sprays may be directed at stainer.

In general, farmers are not given much choice in the insecticides they buy, and most insecticides sold (pyrethroids) are broad-spectrum, controlling both pests as well as beneficial predators. Products such as endosulfan (more specific for control of American bollworm) and less severe on beneficial organisms, dimethoate (for the control of aphids) should be given more consideration in the spray program. In some areas there has been a shortage of insecticides, especially those offered by the CDF at reduces prices, but farmers have been reassured this will not be a problem in the current season (2006/07).

3.1.6 Harvesting and on-farm grading

Harvesting of seed cotton in Tanzania is done by hand. This should lead to high quality seed cotton if care is taken in the field to limit leaf and stick material and contamination with soil. Containers used to transport seed cotton from the field should not add any contaminants.

In the past, cotton was sorted into various grades by the farmer. Since liberalisation of the industry and strong competition by ginners for seed cotton there has been a tendency to pay one price irrespective of grade, which has been a disincentive for farmers to grade their cotton before delivering to the buying posts.

Ideally, cotton sheets or kanga should be used to contain the cotton for transporting to the buying centres, so that no further contamination takes place, which may result if bags woven with synthetic fibres are used.

3.1.7 Cotton Destruction

By-laws regulate that cotton plants must be removed and burnt after harvest. This prevents the carryover of certain pests such as pink bollworm and reduces the risk of bacterial blight

build-up. The cotton is hand-hoed just below (50mm) ground level, where it is easiest to cut the plant. These are then removed outside the field and burnt.

3.1.8 Crop rotations

There is no formal system of crop rotation used by cotton farmers in both WCGA and ECGA. The norm is that where cotton is grown about 60% of the land holding is used for the farmer's food crop and the balance of about 40% is used for cotton. During visits to cotton farmer's fields in WCGA in May 2007, many fields were observed which had been used repeatedly for cotton over a number of consecutive seasons. Ideally, cotton should be rotated at least annually and with other crops such as maize or sorghum, and preferably only returning a land to cotton after a two year break, in order to disrupt insect and disease cycles.

3.1.9 Crop gross margins

Crop gross margins for cotton, maize and sorghum under the current farming practice are given in Section 7.2.2 below, where these are compared with expected gross margins under the proposed production methods.

3.2 Cotton quality and classing

3.2.1 Quality

Rampant contamination has seriously impaired the quality of Tanzania's cotton. Liberalisation of the sector appears to have led to a virtual ignorance about the quality requirements in the cotton production and processing chain as dictated by changing consumer patterns and technological innovations world-wide. This hand-picked, once glorified as "white gold" cotton, involving crop production in zones according to weather patterns and soil conditions, harvesting using 100% cotton cloth bags, sorting and grading, processing into lint according to ginnery zones, etc; have long been abandoned. As a result, contamination is widespread, impacting negatively on fibre quality and poor colour from insect staining and dust, high trash and foreign matter content; etc has resulted in lowering the price of both seed cotton and lint. Fierce competition between seed cotton buyers has also led to practices such as adding water and gravel to seed cotton to increase the weight.

Contamination and quality does not end with the farmer. Several variables affect seed and fibre quality during seed cotton storage. Moisture content is the most important as excess moisture causes stored cotton to overheat, resulting in lint discolouration, lower seed germination and possibly spontaneous combustion. Seed cotton with moisture content above 12% should not be stored. Moisture should be monitored for the first 5-7 days of cotton storage; seed cotton that experience an 11°C rise or are above 49°C should be ginned immediately to avoid the possibility of major loss.

Other variables include length of storage, amount of high-moisture foreign matter, variation in moisture content throughout the stored mass, initial temperature of the seed cotton, temperature of the seed cotton during storage, weather factors during storage (temperature, relative humidity, rainfall) and protection of the cotton from rain and wet ground. Yellowing is accelerated at high temperatures. Both temperature rise and maximum temperature are important. Temperature rise is directly related to the heat generated by biological activity.

The state of disrepair of, especially the old cooperative, gins adds to the reduced quality of the lint produced. These gins are old and rusted, with lots of dust and other contaminants. The channel in which the lint runs is open in some cases allowing further foreign matter to contaminate the lint after ginning but before baling.

Thus, while previously Tanzania once fetched a premium of about US cents 8/lb of lint sold in the international markets, today it is discounted at around US cents 6. According to the International Cotton Advisory Committee, Tanzania cotton was rated lowest in terms of quality among other African country cottons. It fetched only one point; compared with four points for Ugandan, six points for Zambian, seven for Zimbabwean, five for Chadian, and four for Cameroonian cotton.

3.2.2 Capacity to do classing

A seed cotton buyer applying for a licence through TCB must ensure that the buying posts under the application will be manned by experienced seed cotton graders. In reality, because of a shortage of seed cotton and competition among ginners, the buyers are accepting cotton without specifying grade, often paying a single price. This is a disincentive for farmers to produce quality cotton.

Many of the buyers at the buying centres work on a commission basis, based on the volume of cotton purchased. This results in a focus on volume rather than quality. At Cotcop the cashier/weighing clerk and security Guard at each buying station share a commission of TSh 10/kg.

Lint produced by the gins is sent to the Ukiriguru Research Station, which houses Tanzania's only laboratory for testing the quality of lint. However, the gins are not given feedback or reports on the results of these tests.

3.3 Taxes and Levies

A number of taxes and levies (Table 3) are paid along the cotton value-chain. This begins with the farmer who pays TSh 20/kg seed cotton to the Cotton Development Fund. The Cotton Development Fund also receives revenue from the gins (TSh 5/kg) and from the export of lint (3% levy on sales of exported lint).

Table 3: Taxes and Levies

Tax/Levy	Amount	Responsible	Levied on
Cotton Development Fund	TSh 20.00/kg	Farmer	Seed Cotton
	TSh 5.00/kg	Gin	Seed Cotton
	3%	Exporters	Lint Export Price
District Tax CESS	5%	Farmer	Seed Cotton Price
Education Fund	TSh 5.00/kg	Gin	Seed Cotton
VAT	20%	Mills	Oil/Seedcake/Husks

Farmers also pay a District tax while gins have until recently also been required to contribute to the Education Fund and pay a 3% Service Council Levy on its annual turnover. These latter arrangements are now being phased out. When all these charges were being imposed and if the 3% levy on lint exported is excluded from calculations, farmers contributed 43% of the revenue generated through taxes and levies, while gins provided for 26% and oils mills contributed 31%.

3.4 Ginning

3.4.1 Ownership

Until the early 1960s, the ownership and management of ginneries was predominantly a function of the private sector. This changed as private ginners were forced to sell their gins to societies and cooperative unions, due to competing forces basically on the procurement and marketing of cotton. By 1968, almost all ginneries were bought out by the cooperative unions giving them control of not only ginning but the sale of cotton in the country. This situation remained unchanged until the 1990's when government initiated trade liberalization measure.[1]

Changes in the cotton industry have seen the shifting of the cotton growing and ginning capacity in Tanzania from the ECGA areas to the WCGA. In the WCGA 62 gins are owned by the 33 different companies, while 50% of the current lint production is being produced by only 10 of these companies (listed in Table 4 below). The combined monthly capacity of the gins is estimated at 357,960 bales with a storage capacity of 128,000 tons. However, actual production is only estimated at 251,783 bales, 70% of the regions potential capacity. The gin with the largest capacity is owned by NCU (1984) Ltd with a daily bale rating of 1,836 bales or 44,064 bales per month. NCU is currently operating at 57% its capacity (25,128 bales per month). NCU is followed by Shirecu with a capacity to bale 36,000 bales per month; but is currently operating at 62% of its capacity (22,464 bales per month).

[1] 1999b. *1998/99 Marketing Review of Cotton*. Ministry of Agriculture and Cooperatives. Dar es Salaam, December.

In the ECGA, thirteen gins are owned by nine different companies. However, only seven gins are operational (Table 5) and no company (with the exception of the UKI Cooperative Union, who is operating two gins) is operating more than a single gin. The last renovations on gins in the ECGA took place in 1994. The gins operating in the ECGA are running at 31% of their total capacity, with Korogwe running at 75% and Mandera at 48%, while the remaining gins are running at between 25-35% of their capacity. Moshi, however is only operating at 3% if its capacity.

Table 4: Top Ten Cotton Producing Gins in the WCGA

OWNER	RATING DAILY (BALES)	RATING MONTHLY (BALES)	ACTUAL MONTHLY (BALES)	CURRENT OPERATING CAPACITY	STORAGE CAPACITY S/COTTON IN TONS
NCU(1984)LTD	1,836	44,064	25,128	57%	16,000
SHIRECU	1,500	36,000	22,464	62%	12,000
VEARRIAN	852	20,448	14,832	73%	8,000
CARGIL	816	19,584	14,054	72%	2,000
BIRCHAND	660	15,840	12,408	78%	5,000
ALLIANCE	620	14,880	12,960	87%	3,000
L'DATOR	756	14,400	10,800	75%	7,000
JAMBO	585	14,040	12,960	92%	3,000
AFRISIAN	498	13,680	10,944	80%	5,000
LINTX	468	11,520	6,912	60%	3,000
TOTAL TOP 10	**8591**	**204,456**	**143,642**	**70%**	**64,000**
TOTAL WCGA	**14,860**	**357,960**	**251,783**	**70%**	**128,000**

Table 5: Operational Gins in the Eastern Cotton Growing Areas and their Capacity

OWNER	RATING DAILY (BALES)	RATING MONTHLY (BALES)	ACTUAL MONTHLY (BALES)	CURRENT OPERATING CAPACITY
MANDERA	48	1,152	557	48%
KILOSA	40	960	240	25%
MOSHI	40	960	25	3%
M'GORO	60	1,440	384	27%
KOROGWE	20	480	360	75%
KIBEREGE	40	960	240	25%
MWAYA	40	960	336	35%
TOTAL	**288**	**6,912**	**2142**	**31%**

3.4.2 Types of gins

Roller Gin

Roller gins constitute approximately 15% of the world cotton ginning capacity. The latest range of roller gins comprises of a ginning roller, a sectional knife working against the surface of the roller and actuated by a vibrator so that the sections of the knife are oscillating in anti-phase, and a stripping mechanism also made sectional and provided with vanes. The vanes of the sections being turned through an angle sufficient for each vane to engage an appropriate section of the knife and the stripping mechanism being rigidly

coupled to the vibrator through a gearing ratio, which is multiple of the number of the vanes in each section. Such a roller gin increases the efficiency of ginning, enhances the quality and makes it possible to handle any class of cotton irrespective of the degree of attachment of the fibres to the seeds. Older roller gins are incapable of handling the medium-staple cottons featuring a high degree of attachment of the fibres to the seeds. In these gins, the dragging action of the ginning roller surface on the fibres for the latter to be drawn past the knife is insufficient for separating the medium-stapled cotton fibres from the seeds, therefore these cottons are processed using saw gins.

Saw Gins

In industrialized countries saw gins are used for ginning Upland cottons, and roller gins for ginning Pima cottons. Tanzania's preference for roller gins, even though Upland cotton is grown, is based on much lower cost per roller gin stand than for a saw gin stand (see Section 2.2.3 above, with approximate gin costs for the two gin types), and higher availability of labour to man the roller gins, which for equal working widths, are about 10 times slower than saw gins at processing an equal volume of seed cotton to lint. Saw gins give about 1.5% lower ginning out turn (GOT) that roller gins.

3.4.3 Services offered to farmers

As a rule, the gins do not offer any services directly to the farmers. Gins are informed through the TCB what seed quantities are required in their area and these are delivered to the buying centres for distribution.

However, a few privately owned gins (most notably Cotcop) have seen the advantages of developing close working relationships with the farmers supplying them with seed cotton. Cotcop monitors the cotton through the growing season to ascertain and ensure that they receive the required quantities for the coming ginning season. In addition to monitoring the growers, Cotcop has:

- established a demonstration unit to demonstrate good cotton husbandry
- organised regular "training" sessions/information days to expose the farmers to the grading and classing of cotton and explaining the importance of producing quality cotton.

3.5 Status of Existing Gins

The condition of existing gins in Tanzania is highly variable, ranging from dilapidated predominantly co-operative owned to modern "state of the art" and well-maintained privately owned facilities. A number of gins are undergoing recapitalisation and installing modern roller gins. Two gins at opposite ends of the scales in the WCGA were visited. The gins were undergoing the final stages of repairs and maintenance in preparation for the harvesting, purchasing and ginning of seed cotton to commence in mid-June.Nyanza Co-operative Union (1984) Ltd.

3.5.1 Nyanza Co-operative Union (1984) Ltd.

The Nyanza Co-operative Union (NCU) gin has the largest ginning capacity in the WCGA, however, the gin outside Geita is in need of recapitalisation. Bearing in mind that activity was geared to repairs and maintenance, it was however concerning that with two weeks before the ginning season was due to begin not a single assembled and operational gin was to be found on the premises.

Figure 3: NCU Gin visited outside Geita

3.5.2 Cotcop (Geita)

In contrast the privately owned gin, Cotcop, at Geita illustrates the other end of the spectrum. The grounds are immaculate and the facilities are well maintained.

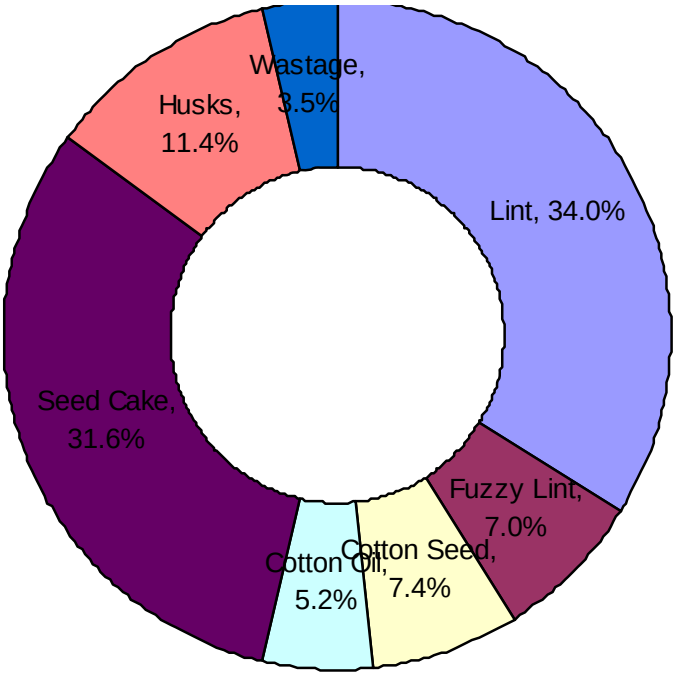


Figure 4: Cotcop Facilities outside Geita

3.5.3 Revenue Generated by Gins

The largest cost incurred by gins is the purchase of seed cotton (cost of sales); this represents 72% of the variable production costs. The free-market system of seed cotton purchase increases pressure on this particular variable cost. One strategy employed by many gins is an agreement with the farmers to pay the going price for seed cotton (TSh 350/kg) as well as paying the CDF levy on their behalf. The CDF Levy although levied against the farmer is administratively paid by the gin to the CDF, this allows the gins to pay "on behalf of" the farmer, this effectively increases the price paid for seed cotton by the levied amount.

Seed Cotton purchased can be processed into a number of products as indicated in Table 6 below.

Figure 5: Products Produced from Seed Cotton

One ton of seed cotton should produce approximately 340kg of lint and 660kg of cotton seed. This seed can either be sold on to oil millers for further processing into cotton seed oil, seed cake and husks or to farmers through the CDF for planting the next season. Approximately 12.5% of the cotton seed is redistributed back to the farmers through the CDF, with the remainder either processed in oil mills associated with the gin or sold on to independent oil millers. The revenue generated for the gin through the sale of seed cotton back to the farmers is only 1% of the total revenue generated from a kilogram of seed cotton (see Source: Prof F Matambalya, 2007 using data from NBS and MAFC Figure 6 below).

Table 6: Revenue Generated from Seed Cotton

	%/kg	Revenue	% of Total Revenue off 1kg
Seed Cotton		TSh 350/kg	33%
Lint	34.0%	$1.1/kg	46%
Fuzzy Lint	7.0%	$0.57/kg	5%
Cotton Seed	7.4%	TSh 30/kg (to millers)	2%
Seed for Planting		TSh 120/kg (to CDF)	1%
Cotton Oil	5.2%	TSh 1500/kg	8%
Seed Cake	31.6%	$105/MT	4%
Husks	11.4%	$70/MT	1%
Wastage	3.5%		

The total revenue generated from the sale of cotton seed only represents 3% of the total revenue generated off a kilogram of seed cotton. For the gin, this would only represent 5% of the revenue generated; the remaining 95% is generated form the sale of lint. The sale of seed to the CDF for redistribution to the farmers currently generates approximately 2% of the revenue generated by the gin. This is due to seed cotton sold for planting, fetching a higher price (TSh 120/kg) than that sold into the oil milling industry (TSh 30/kg).

Should the production of seed be outsourced to private parties and the gins forced to direct their total volume of seed into the oil milling industry, this would represent 1.5% drop in total revenue generated by the gin. The kg of cotton that would have been sold to the CDF for TSh 120 has the potential of generating TSh 1,780 in revenue once converted to cotton seed oil, seed cake and husks.

3.6 Constraints and challenges

3.6.1 Climatic Risk

The farmer has little control over risk associated with mid-season dry spells. Risk of dry spells is aggravated if weed control has been poor, with the weeds competing with the crop for soil water reserves.

Modern trends towards Conservation Agriculture (CA), which maintains a cover of crop residues on the soil surface, will provide a measure of drought relief. It has been found that soil moisture levels under CA increase significantly because of reduced evaporation of soil moisture and increased rain infiltration, providing the same effect as an additional 100mm of rainfall over the season.

3.6.2 Access to finance

Farmer

Access to finance is currently a huge challenge for the farmer. This has been recognised by the TCB who are currently piloting a passbook system to enforce savings by the farmer to secure inputs for the next season.

A wide network and well established micro-financing industry (MFI) exists in Tanzania (this industry is a subject in itself and will not be covered in this report). However, an interest rate of between 20 and 30% does not allow the farmer to access these loans, as the profit margins of the farmers limits their ability to carry the additional financing costs. The inherent risky nature of farming also results in the interest rate for farmers being exceedingly high due to their high risk profile.

Commercial banks will not deal with individual farmers, but would look at group schemes such as those offered by the National Commercial Bank. This would require farmers to

group themselves or operate through an organisation in order to access the loan. The current interest rate for such a loan is between 14 and 20% depending on the risk profile.

Exim Bank is currently working in collaboration with the Tanzanian Government to provide agricultural inputs to farmers. Farmers apply for input loans through village based organisations. These loans are channelled and approved by the Ministry of Agriculture who then forwards the list to Exim Bank who then administer the process. The Bank itself interviews the farmers and further refines the list before "approving the loan". The loan is subject to the farmer being able to provide security and a title/lease (two years) deed on his/her land. This is currently problematic and is impeding access to this mean of finance.

Gin

Finance is more readily accessible to the gins than to the farmers. This is as a result of the gins having more assets to assign as security and collateral. Gins can use tools such as the Warehouse Receipt System (WRS) to secure loan financing. The WRS uses the gins stock on hand of lint as security for raising loan financing. Because of the tangible nature of the assets associated with gins, investors are more likely to invest in such a venture, allowing capital to be raised for refurbishment. Gins that have a secured markets and a good relationship with their clients can also secure advanced payment on shipments of lint.

Government also offers a range of facilities which include:

- Export Credit Guarantee
- Central Bank Refinancing schemes
- Export-Import Bank faculties
- Credit Insurance facilities

Local commercial banks offer a range of financing and "insurance packages" services to the ginning industry, such as those services offered by the CRDB Bank:

- Provision of pre-shipment and post-shipment financing facilities (O/D, Term Loans, discounting etc)
- Help in the collection process
- Advise and confirm letters of credit
- Booking of acceptance and discounting of drafts
- Offering of advisory services such as providing credit and country information on the buyers free of charges.
- Taking foreign exchange risks (spot, forward, swap etc).
- Taking market risks (options)

3.6.3 Price Fluctuation

The free market environment, in which seed cotton is purchased, has resulted in the farmers being unable to determine what price they will receive for their cotton at the time of

planting. Once harvested, farmers can then move from buying centre to buying centre in search of the best price. This volatile market in which the gins compete for seed cotton has both advantages and disadvantages. The farmer has as a result received a higher percentage of the export value of lint, but what this value is, is determined by the international stocks and trade in lint.

Lint is a non-perishable product and can therefore be stored during periods when supply exceeds demand. However, as this cache of stored lint increases, so the demand for additional lint decreases resulting in a decrease in the price. This decrease is then passed on to the farmer. Conversely an increase in demand and therefore price is also passed on. The problem lies with the availability and analysis/forecasting of what the lint price is expected to be for that particular season at the time of planting. This information would enable the farmer to be able to make a decision on whether to plant or not.

Similarly, the free market system does not allow the gins to accurately predict what the largest variable cost item; the purchase of seed cotton (72%) is going to be for the season.[2]

Error! Reference source not found. shows that the current situation in cotton traded on the world market is a slight decrease (433ml MT) in the stock of cotton, this is as a result of the lower cotton price paid in 2005/06 ($1023.03 MT). However, current stock levels are still high which may keep prices down during the 2007/08 season. This lower price will be passed on to both the gins and the farmers.

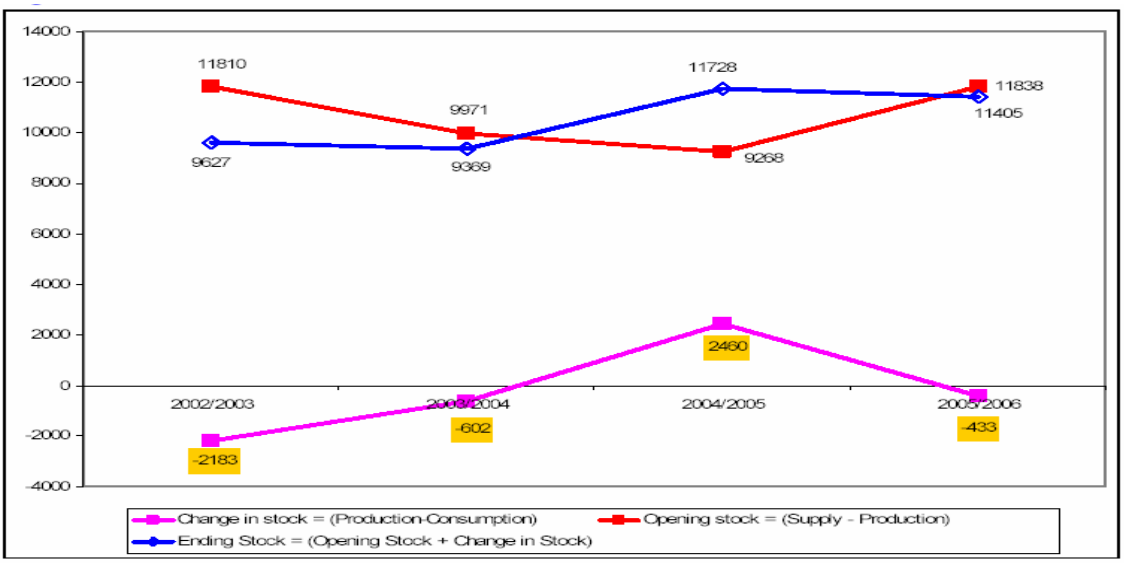


Figure 6: Global Cotton Stocks in Mill Metric Tons

[2] Data provided in source: Prof F Matambalya, 2007 using data from NBS and MAFC

4 RESEARCH AND EXTENSION

Introduction

In the WCGA, lower soil fertility is the main factor resulting in reduced yields, whilst insect pests can reduce yields by 40-50%. Weed competition in the first 6-8 weeks after crop germination can reduce yields by between 45-85%. In the northern areas, *Cynodon* spp. and *Cyperus* spp. are important weeds and in southern areas broadleaf weeds and *Cyperus* are important on the heavier soils.

In the ECGA, insect pests and weed pressures are generally higher than in the WCGA. Soil fertility on the heavier soils is also higher than in ECGA.

4.1 Research

Ukiriguru Cotton Research Station (UKRS) is situated 43km from Mwanza and services the WCGA, and Ilonga Agricultural Research Institute (IARI) situated near Kilosa, services the ECGA. Both research stations fall under the Department of Research and Training within the Ministry of Agriculture, Food Security and Cooperatives. Ukiriguru is the larger research station and has a director in charge. It has several departments conducting research into plant breeding, entomology, plant pathology, soils and agronomy, farm economics and fibre technology.

The objectives of research at UKRS are to develop high yielding varieties resistant to major pests and diseases and which are suitable for the agro-climatic conditions of those areas. Other main areas of research are:

- pest and disease control.
- integration of soil fertility management with multiplication and production of high quality breeder seed.

UKRS have a total of 20 professional and technical staff in the departments listed, but lack a fibre technologist.

IARI's cotton section conducts research in plant breeding, entomology and agronomy. Staff comprises only of a regional director, an entomologist and a junior plant breeder, and three technicians.

In the ECGA, where insect pest, disease and weed pressures are generally higher than in WCGA, and soil fertility on heavier soils is also higher than in WCGA, research is aimed at sustainable and cost-effective production to improve financial returns to farmers.

4.1.1 Review of status of cotton research

WCGA

The variety UK91, released in the year 1992, is now being grown throughout the area and has replaced the two previously grown varieties UK77 and UK82. These varieties have deteriorated largely as a result of mixing. Each of these varieties was bred for specific agro-climatic conditions of the northern and southern parts of WCGA. UK77 was grown in the wetter northern areas and UK82 in the drier southern areas. Mixing of the two varieties from seed supplied by ginneries took place and they are no longer considered to be pure lines. As a result, resistance to pests and diseases had deteriorated as did the cotton yields. UK91 was bred for the agro-climatic conditions for the whole WCGA, and was released by the research station as a replacement for UK77 and UK82. The breeders seed from the research station was handed to TCB for multiplication.

Plant Breeding

UK91 was bred and released in 1992. The seed was initially multiplied on the research station and on out grower farms under supervision, before handing over for commercial multiplication under the supervision of TCB.

The main objective of plant breeding is to develop improved varieties with a high yielding potential, disease and pest resistance, high ginning and fibre quality that are superior to existing varieties. Other activities include the multiplication and production of breeders' seed. To achieve this, the following work is conducted:-

- evaluation of cotton progenies.
- evaluation of cotton strains.
- multiplication of seed for cotton strains and lines, and commercial varieties.
- multiplication of breeders' seed.
- on farm trials

No work has yet been done with genetically (Bt) modified cotton.

Entomology

The main objectives are to identify cheap effective methods of pest control. Main pests include American bollworm, aphids, jassids, and blue bugs. Spiny and pink bollworms, lygus and stainers are minor pests and the red spider does not appear to be a problem.

Research includes:

- evaluation of insecticides.
- integrated pest management (IPM) using scouting techniques and trap crops.
- training farmers in scouting and spraying techniques.

Future developments include:

- training extension staff in scouting and spraying. Trials have indicated three sprays starting 10 weeks after emergence using ULV plus sprayers are suitable.

Agronomy

The main objectives are to develop cheap cost effective sustainable methods of soil fertility management to improve cotton yields. This is achieved using demonstrations with fertilizers, management practices and crop rotations on the research station and on-farm trials. Fertiliser trials with inorganic fertilizers and farmyard manure (FYM) have produced increased yields, and are necessary on the low fertility sandy soils in the WCGA. Timing of fertilizer application is important, and if applied incorrectly – soil moisture content and cotton stage of growth, may adversely affect their efficiency.

Time of planting is important and the optimum time is during December. Early planting (by one month) or late planting (by one month) can reduce yields by 50-70%. Late weeding and thinning can also reduce yields by as much as 70%. These practices ensure boll maturity and splitting coincide with the dry season (April/May).

ECGA

The variety ALAI90 (also known as Mkombozi) was released in 1990 by Ilonga Research Station. The seed was multiplied on the station.

Agronomy research on crop management has included time of planting, crop spacings, fertilizer trials, inter-cropping and weed control have been investigated. Research achievements include insect pest control based on scouting. Due to more severe insect pressures, the threshold for spraying has been established as 10 flared holed squares per 50 plants, i.e. 20%. Nine insecticides have been evaluated and registered for use. Work has also identified insect predators. Extension materials are prepared on the station. Red bollworm surveys are conducted in both cotton growing and quarantine areas. Inter-cropping trials with cotton are conducted. The current research includes:-

- evaluation of insecticides.
- surveys on cotton pests and diseases.
- preparation of extension materials for farmers.
- training of EO's on IPM.
- potential entry and damage by RBW.
- determination of toxic residues from sprays on inter-cropped cowpeas.

4.1.2 Research strengths and weaknesses

The research stations are considered to be moderately well performing. Both have successfully released new varieties and introduced sound pest control and agronomic practices. The output could have been greater had research funding been improved, and this lack of funding must surely reflect on the performance of the research staff. Staff are paid by the Ministry of Agriculture, and many workers have had long service. Many are now

approaching retirement and it is debatable if government will replace them on retirement. Past staff redundancies have resulted in staff shortages and these posts have not been filled in recent times. Research workers do not receive in-service training and poor funding does not allow them to attend international conferences and meetings, which are essential for progressive research. The post of fibre-technologist at Ukiriguru has not been filled and does not appear to exist at Ilonga. Such work is necessary during the development of new varieties. There have been no new varieties released since 1990. The libraries are poorly funded and lack international journals on agricultural research. There is also a lack of communication between research workers at the two research stations. Closer liaison would improve the quality and quantity of their output. The TCB has set up a crop development committee which could enhance research, but so far this has not met.

4.2 Extension

Cotton yields in Tanzania are some of the lowest in Africa and are produced on between 350,000-400,000 ha by some 350,000 small holder farmers. These farmers tend to be scattered over a large area of the country's seven regions in the WCGA and six regions in the ECGA. The industry, however, is a sleeping giant with a great potential to expand in area and yield production. One of the main reasons for the low yield attained is the poor extension services provided to farmers.

4.2.1 Review of status of cotton extension

The extension services fall within the Ministry of Agriculture, Food Security and Cooperatives. It is headed by a Director of Extension Services, and reporting to him is a Head of Department. The extension service to farmers, however, is not the monopoly of government, and the TCB also employs 11 extension officers (EO's) who service 29 districts in the WCGA.

The broad structure of the government extension service is outlined below:-

Each cotton growing area e.g. WCGA, is divided into seven regions, and each region has several districts. Mwanza region for example, has seven districts. Each district comprises of wards, which are the administrative areas that serve about 5-6 villages. The seven districts in Mwanza encompasses approximately 680 villages in which there are about 500,000 households, each having about six people per household. The total population in Mwanza region being nearly three million people. Not all households farm, but many do.

Ideally, there should be one E.O supervising and advising each ward (4-6 villages) and in Mwanza there should be some 115-170 E.O's at village level, but in practice 1 village E.O services approximately 1850 households. This is clearly too many households for competent service. . These transport facilities are also considered inadequate for a region the size of Mwanza.

The EO's should provide the following service and advice to cotton producers:-

- crop rotations.
- land preparation.
- planting viz. row spacing, varieties, plant populations, fertilizing and manuring, depth of planting and thinning.
- weed control practices.
- insect control viz identification of pests and beneficial organisms, scouting for pests, methods and timing of sprays, choice of insecticides and when to stop spraying.
- hand picking, grading and sale of the crop.

The extension staff are usually trained at colleges at research stations, where certificates are awarded following a two-year course, and diplomas following a further two-year study.

Where E.O's do not exist, cotton inspectors assist in providing advice to farmers.

4.2.2 Extension strengths and weaknesses

Lack of funding for employment, recruitment and training of EO's is perhaps the single most factor limiting the outreach to farmers. This lack of funds extends to the provision of transport of extension officers to farmers. It has resulted in the Ministry having less than 50% of staff requirements. The lack of transport is a major factor limiting the number of visits made to farmers each day. For example in Mwanza there are only seven vehicles (of which two are defective), amongst 100 district EO's and 20 sector-cycles and 19 bicycles amongst over 200 village EO's. (See Appendix E).

Roads in rural areas are in extremely poor condition, making access to farmers difficult. The large number of farmers scattered over a large area of the country and, the EO's with limited transport on poor roads, creates a great physical problem for EO's to visit farmers. These factors limit the training of farmers in many aspects of cotton production. Where farmers are serviced regularly (farmers closer to main centres on good roads) the standard of crops is good and is likely to result in higher yields.

One of the few strengths in the extension service is that the EO's appear to be well trained and knowledgeable.

5 MAIN CONSTRAINTS AND POSSIBLE SOLUTIONS

Research findings by Ukiriguru and Ilonga research stations are summarised in Table 7 below:

Table 7: Summary of cotton research findings at Ukiriguru and Ilonga Agricultural Research Institutes

Yield limiting factor	WCGA Yield decline Ukiriguru research	ECGA Yield decline (estimated)
Soil fertility exhaustion through continuous cropping without the addition of fertilizers or manure	75 %	45 % (acidity?)
Late planting 1 month	68 %	25 %
Weeds (late weeding and thinning)	59 %	65 %
Insect damage (no insecticides)	28 %	50 %

The preceding sections have highlighted a number of constraints and challenges to the farmers and ginners. A number of constraints to farmers and ginners were raised at the stakeholder workshops held in Mwanza and Morogoro, and have been included in Appendices C and D.

5.1 Summary of constraints to farmers and possible solutions

Table 8 below summarises the constraints faced by farmers and possible solutions:

Table 8: Summary of constraints faced by farmers

Constraint	Possible solution
Lack of access to credit	Access to credit through lending and saving in village banks
Soil erosion	Conservation agriculture
Soil fertility decline	Fertilisers, manures, “green manure” crops
Labour shortages for weeding	Herbicides, smother crops
Extension	Farmer Field Schools (FFS)initiated by Ministry of Agriculture, Food and Cooperatives extension division
Exploitation by unscrupulous buyers	TCB to notify farmers on seed cotton indicative prices through radio announcements

5.2 Summary of constraints to ginners and possible solutions

Table 9 below summarises the constraints faced by ginners and possible solutions:

Table 9: Summary of constraints faced by ginners

Constraint	Possible solution
Shortage of seed cotton	Increase farmer yields. Out growers contracted by ginners could increase volumes.
Mixing of seed lowering quality	TCB to outsource seed multiplication, cleaning, packaging and distribution to private companies
Seed cotton purchases that bypass the passbook system	All licensed seed cotton buyers to follow a single system of recording purchases and thereby an accurate feedback of cotton areas per buying post
Low quality seed cotton through poor field husbandry	Farmer Field School (FFS) as channel for training in best farming methods. Competition to reward leading FFS according to yield and quality
Lack of trained ginnery technicians	Government to establish institute for training ginnery technicians

5.3 Recommended improvements to research to ensure sustainability

Lack of funds appear to be the biggest limiting factor in the development of satisfactory research. The Ministry of Agriculture should provide greater funding for research activities at both research stations. This should take the form of salaries for research workers, especially to fill vacant posts that were previously declared redundant. Funding of research projects is another area that requires attention. This needs to be improved and there is also a need for financing transport to allow for off-station trials and extension. Funds are necessary for trials, transport, laboratory equipment, library and attendance of meetings locally and internationally. Recommended improvements to extension to ensure sustainability.

There is an urgent need for funding to increase the number of EO's, especially at village-level. At present, it appears that one EO services some 1,500 households (see Appendix E). With such vast numbers it is not possible to provide satisfactory service to farmers. The MOA and the CDF should look into prioritising funding for such important service to farmers by strengthening of extension services which could lead to higher production on farms. An extension service could be part of research station activities and should be part of the services provided by them. This could reduce some of the overheads in the extension

department. It would also make for easier in-service training of officers. The EO's from the TCB could also be incorporated into the existing structure. Extension is not the monopoly of the government. The private sector, especially the chemical suppliers, could become more involved in providing training on the use of pesticides, scouting and spraying equipment. There should be incentives to provide better services to farmers. In countries like South Africa and Zimbabwe, chemical companies and, to a lesser extent, seed companies provide invaluable services to farmers advising on many aspects of growing of crops and pest control management. In Tanzania, these private sector companies should be encouraged to participate more.

Ideally, there should be an objective to provide one EO per every 300-400 households (farmers). Such an EO should be mobile and provided with motor-cycles to allow 3-5 visits per day. This could allow over 100 visits per month. Visits should be made to groups of farmers living near together and as such farmers could be visited more regularly.

There is a need to improve rural infrastructure, especially roads which presently must result in deterioration of motorized transport. The poor road conditions must also slow down travelling between farms and thus reduce the number of visits that can be made to farmers. Therefore there is also a need for graders and equipment to maintain these roads. Strategies for improving cotton production in WCGA and ECGA.

5.4 Strategies for improving cotton production in WCGA and ECGA

The main limiting factors to attaining high cotton yields, as observed in research at Ukiriguru and Ilonga Agricultural Research Institutes, were listed in Table 7 above. Table 10 below shows a general strategy to overcome these constraints:

Table 10: Limiting factors to cotton production and strategies to overcome these

Limiting factor	**Strategy to overcome**
Soil fertility	Integrated Soil Fertility Management (ISFM): Vertisols, fertilisers, green manure crops, animal manure, and low demand crops e.g. cassava to allow time for soil nutrient replenishment through mineralisation, crop rotations with legumes.
Late planting (1 month)	Labour efficient No-till for growing food crops, releasing labour for cotton.
Weeds (late weeding and thinning)	Integrated Weed Management (IWM): No-till planting using glyphosate, "short fallow smother crops" and mulches to suppress weeds.
Insect damage (no insecticides)	Integrated Pest Management (IPM): Scouting and timely insecticide sprays, Conservation Agriculture where the vegetative cover and rotation crops provide suitable habitats for predators of insect pests.

ECGA does not have a critical mass of farmers to support licensed cotton buyers and buying posts. On the other hand, the WCGA is a much more “mature” cotton industry which lends itself to a strategy of a Cotton Development Agency (CDA) supported by all the stakeholders and facilitating key services to the farmers:

- Credit
- Extension
- Mechanisation services

Prospects for further cotton expansion may lie in the development of farmers as out growers linked to commercial companies (e.g. ginneries) operating in the areas. This could lead to larger-scale farms. Three companies, including Holden Ginners and Morogoro Ginnery, have shown interest in this development.

The TCB is also expecting large scale irrigated cotton cultivation programmes in the Rufiji Valley by Euro Vistaa and Ruwe Farms, to name some of the companies aiming to engage in large-scale irrigated cotton farming from 2007/08.

6 SEED SOURCING, MULTIPLICATION, PROCESSING AND DISTRIBUTION

6.1 Privatisation of seed production

The seed used for planting is not certified and in the past, varieties have been mixed at ginneries with resultant loss in disease resistance and losses in yield and lint quality. Because of this, the TCB has suggested that privatisation of this sector to overcome these problems should be recommended. Talks have already taken place on this subject with Quoton in Zimbabwe and the US seed company Delta Pine have shown interest.

The situation of Quoton in Zimbabwe is a good example on how this could be achieved. The rights to sell seed bred at local research stations viz UK91 and ALAI90, would be passed on to the company and royalties for these paid to the research stations. The company would then be responsible for multiplication and the ginning of seed. Multiplication should take place on the company's own farms under supervision. The seed would then be delinted, fungicide-treated, packed in suitably sized bags and then sold to farmers. Existing sales channels could be used. Ideally such seed sold should be acid-delinted.

The company should also have a breeding and research division for the development of new and improved varieties. This would reduce the workload and costs on research stations, who presently conduct this work. Such savings could be channelled into other important fields or to subsidise seed costs to farmers.

Obviously, seed would now be sold at realistic prices, however, these could be subsidised as suggested above. In Zimbabwe, the cost of seed represents about 5% of input costs which is a realistic value.

6.2 Processing

Delinted cotton seed from cotton supplied to ginneries is utilised for seed by farmers (delinted seed). A problem, however, has arisen in the past from the mixing of varieties ginns, and this has resulted in a deterioration of resistance to diseases and subsequent yield losses. Such problems could be overcome if seed production for planting were to be managed by the private sector. This is done in Zimbabwe. Here the rights for all varieties including those developed by the Cotton Research Institute are held by the seed company Quoton. It pays royalties for these to the Research Institute for all the cotton seed sold to farmers. Quoton also have their own breeding and research division, which is currently developing their own varieties.

Multiplication of the seed is strictly controlled by the seed company. This seed is multiplied by selected farmers and bought by Quoton. They gin this at selected designated ginneries. From here it is packed into 5kg, 10kg and 20kg bags, which are coded and then sold to farmers through depots around the cotton growing areas. Most is sold on credit to farmers through the ginning companies. A limited amount is bought by for cash. If the seed is treated with a fungicide it sells at US$0.60 per kg and for $1.00 per kg for aphicide treated seed. These prices represent 5% and 8% of total costs or production.

In Tanzania, the research stations multiply foundation seed on-station and off-station fields. This is closely monitored. This foundation seed is released to the TCB and is multiplied by ginneries on farms that are free of cotton from earlier releases. It is this seed that is ginned separately and is then released to farmers to plant. Thereafter, it is cotton seed from the cotton sold to ginneries that is used to supply farmer's needs. There is no seed certification and therefore no guarantee of variety purity.

Seed requirements for the 2006/07 are listed below (tons of "fuzzy seed"):-

Table 11: Cotton seed requirements by region for 2006/07

	Tons
Shinyanga	11,877
Mwanza	5,000
Mara	1,000
Kagera	422
Singida	115
Kigoma	37
Total WGCA	± 15,000
Morogoro	76
Mbeya and Pwari	14
Iringa	5
Tanga	13
Kilimanjaro	6
Manyara	10
Total ECGA	± 125

The seed is largely distributed to farmers in 5kg packs. (Seed is planted at a rate of 7 kg/acre).

6.2.1 Delinting

The importance of good seed cannot be over-emphasised. Removal of excess fibres and removal of immature and dead seed and application of fungicidal seed-dressings all assist in improved germination and subsequent yield. Acid delinted cotton seed has been shown to yield higher than non-acid delinted seed by as much as 20%. The cost for doing this is claimed to be moderate. Non-acid delinted seed has been found to contain fungal spores

and bacteria, and removal of these can be done by acid delinting and this is thought to be the reason why acid-delinted seed results in higher yields.

The basic process in acid delinting involves the loading of fuzzy seed into a metering feed-hopper. The seed from this is fed at a precisely controlled rate ensuring a uniform flow. A flame delinter then removes long tags of lint attached to the seed before it enters an acid reactor. Here the fuzzy seed is mixed with an aqueous sulphuric acid solution. The quantity of acid, water and surfactant are controlled electronically. The seed is then centrifuged to remove excess aqueous acid from the seed. It is then conveyed to a rotary drum drier, where the water fraction is evaporated, thereby concentrating the acid. A buffer then scrubs off remaining lint leaving a smooth seed. The seed is then sorted into fractions - good seed, middlings and rejected materials. The good seed is then fungicide treated and packaged. (From Continental Eagle Corp., Prattville, Alabama, USA).

6.2.2 Packaging and distribution

Under the current system, the seed after ginning (fuzzy seed) is handled by the ginneries. Except for new varieties, the seed distributed to farmers is the seed retained from the previous season's ginning activities. Ginners are required to retain 10% of the seed from the ginning process. This must come from Fusarum wilt-free production zones. It is then dressed with fungicides against seedling diseases and packaged into 10kg bags. Farmers are charged TSh 100 per kg of seed, which covers the cost of seed (selling to oil-mills at Tsh 60 per kg) plus cost of treating, packaging and distribution.

Distribution of certified seed under the privatised system could follow the existing channels. Under the current system the seed is distributed to farmers through various channels. 33% is sold through ginneries, 32% through the buying agent in villages, 15% through stockists, 14% through primary societies and the remaining 6% from other farmers. The passbook system is frequently used to pay for seed.

7 PROPOSED NEW TECHNOLOGIES FOR RODUCTION

In the ECGA, there are vast areas of land that are idle and unproductive. Large scale commercial farming is one way to solve these problems. Such a system has been used in South Africa, where the Makhathini Cotton Company has established a ginnery and it farms land surrounding this commercially. This serves as a hub, around which small holder farmers produce cotton. On the commercial farmland modern farming practices are used viz tractor ploughing, weed and pest control. Equipment used for this is available to assist the small holder farmer and is hired out to mechanically plough land and spray crops. This has been done successfully with accompanying yield increases by the small holder farmer. Such a system could be followed in Tanzania and in the ECGA, the ginneries could farm and form a hub, where they could grow cotton commercially on a larger scale, as well as assisting surrounding small holders with land preparation and the supply and application of inputs such as inorganic fertilizer, planting and spraying. This is one of the incentives offered by government to investors. Costs for this could be recovered from the sale of increased cotton produced.

7.1 Methods of production

Conservation Agriculture (CA) methods are proposed, because they are considered to be appropriate to overcome the severe cotton yield losses through difficulty in controlling weeds using hand hoes. The current methods of production are compared with conservation agriculture in Table 12 below:

Table 12: Comparison of current cotton farming practices and those used in Conservation Agriculture (CA)

Current practice	Proposed practice, using conservation agriculture methods	Comments
Inversion of the top 5cm layer of soil using hand hoes, in order to control weeds and prepare a seedbed	Weeds are controlled using a "smother crop" or with a broad spectrum herbicide such as glyphosate. Minimum soil disturbance – soil could be ripped on the row if there is a compacted soil layer. At planting the soil is minimally disturbed using a V hoe (see Figure 7) for opening the fertiliser and seed slot, or an animal traction (AT) single row no-till planter. A suitable planter has a cutting disc coulter to cut through crop residues, a knife opener for fertiliser and double disc openers to create a V slot for the seed, with closing/press wheels to cover the seed with soil and to press soil down over the seed to ensure good seed-soil contact (see Figure 8 and Figure 9 which show an AT no-till planter)	Hand hoeing for seedbed preparation and weed control requires much labour input and is often neglected in cotton because farmers give priority to their food crops.
All crop residues removed through grazing and tillage using hand hoes or animal traction to pull a mouldboard plough	Crop residues and green manure crop retained as a cover on the soil surface. Green manure crops are killed using a knife roller.	Soil cover by the mulch provided by food or green manure residues help to prevent soil erosion and also reduce soil moisture losses through evaporation
No specific crop rotations	Emphasis on crop rotations,	Rotating with crops of different types such as cotton with grass crops and legumes, will help to break disease cycles and will exploit the nitrogen fixation benefits of rhizobia which form in the nodules on the roots of certain legumes.

Figure 7. Knapsack sprayer for herbicides and insecticides and V hoe for opening a soil slot for fertiliser/manure and seed

Figure 8. Animal traction no-tillage planter

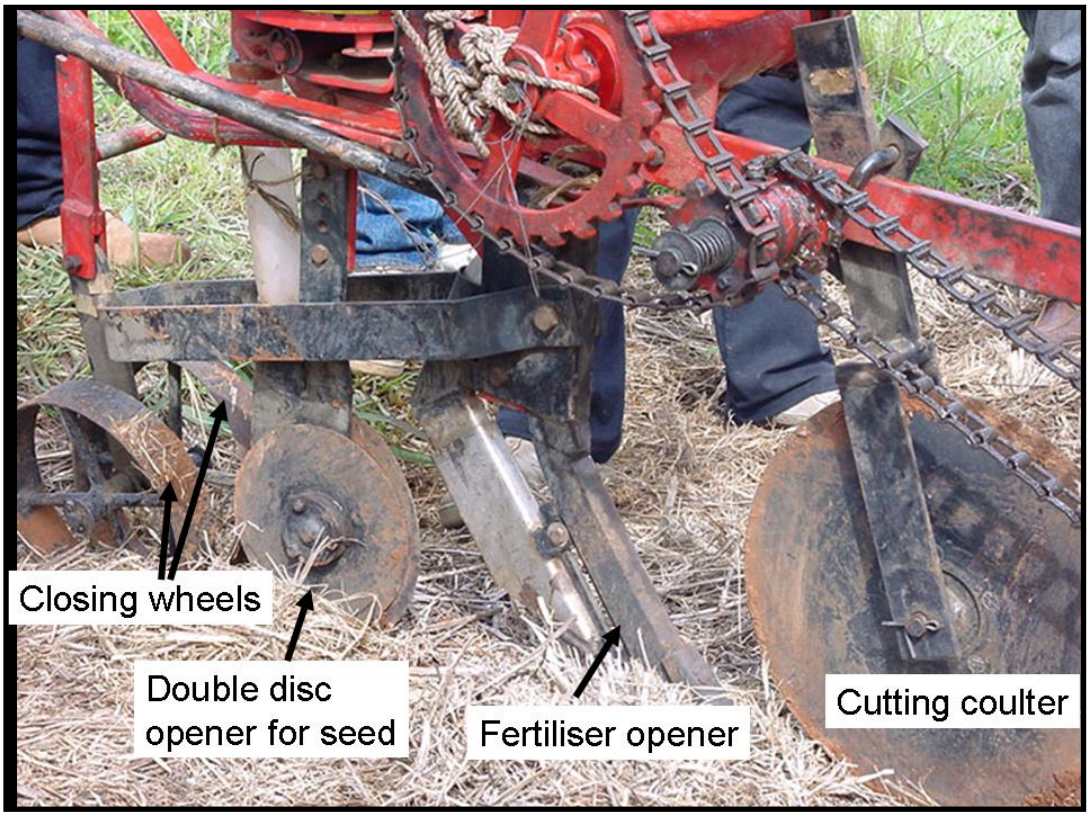


Figure 9. Close-up of AT planter showing cutting coulter and various openers and the depth gauging and closing wheel

Figure 10. Knife roller for killing green manure cover crops

7.1.1 Land preparation and weed control

As mentioned in Table 12 above, the proposed new land preparation methods will involve weed control using the broad spectrum herbicide glyphosate or a “smother crop” such as a vigorous legume grown as short duration fallow.

Weeds are controlled using a “smother crop” or with a broad spectrum herbicide such as glyphosate.

The soils should be minimally disturbed. If there is a compacted layer the soil could be ripped on the row, with the inter-row area left undisturbed.

Crop residues and green manure crop should be retained as a cover on the soil surface. Green manure crops that are still growing prior to planting the cotton are killed using a knife roller.

7.1.2 Seeding

At planting the soil should be minimally disturbed using a V hoe for opening the fertiliser and seed slot, or an animal traction (AT) single row no-till planter. A suitable planter has a cutting disc coulter to cut through crop residues, a knife opener for fertiliser and double disc openers to create a V slot for the seed, with closing/press wheels to cover the seed with soil and to press soil down over the seed to ensure good seed-soil contact.

7.1.3 Fertilisation and liming

Soil testing for determining soil nutrient levels and need for lime should be done at least every three years. Soil nutrient levels should be maintained through the addition of fertilisers or manure.

Nitrogen levels in the soil can also be increased through decomposition of the residues of certain legumes which have atmospheric nitrogen fixing rhizobia, which form in the nodules on the roots of the legumes.

7.1.4 Weed control

Since grasses including *Cynodon* sp. are important weeds, the use of glyphosate herbicide pre-plant, is recommended. This system fits in well with the proposed no-till method of production. Application is made shortly before planting and would start mid-November in the WCGA and mid-February in the ECGA. Rates of application are generally 3-5 L/ha, but where Cynodon is a major problem the higher rates are used. Application is best done using tractor sprayers applying spray volumes of at least 100-150 L/ha.

The cotton would be direct drilled into the seed bed after treatment (within 1-3 days). This will provide weed-free seed beds but further weed control after planting should take the form of hand-weeding or ox-drawn cultivators. Weeding to start 30-40 days after planting, and timed when weeds have started to germinate. A second weeding should follow 30 days after the first weeding, and again by a third weeding some 30 days after the second weeding. Weeding should coincide with germination of weeds and should be timed when flushes of weeds take place. It is possible that a fourth weeding may be necessary in ECGA for the control of the germinating weeds.

As the system of no-till progresses over seasons, experience has shown that weed pressures will reduce, requiring progressively less weeding operations.

As mentioned in Table 12 above, the proposed new land preparation methods will involve weed control using the broad spectrum herbicide glyphosate or a “smother crop” such as a vigorous legume grown as short duration fallow.

Weeds are controlled using a “smother crop” or with a broad spectrum herbicide such as glyphosate.

The soils should be minimally disturbance. If there is a compacted layer the soil could be ripped on the row, with the inter row area left undisturbed.

Crop residues and green manure crop should be retained as a cover on the soil surface. Green manure crops that are still growing prior to planting the cotton are killed using a knife roller.

7.1.5 Insect control

An integrated pest management (IPM) is recommended to keep pests and diseases under economic threshold levels by combining:-

- cultural methods (crop rotations).
- biological methods (using resistant varieties, and encouragement of predators).
- sanitation (destruction of crop residues).
- chemical control (scouting and judicious application of insecticides).

CA, which maintains mulch on the soil surface and utilises crop rotations, will provide suitable habitats for predators of insect pests.

Light coloured mulches, such as dried maize or sorghum residues, reflect solar radiation and illuminate the underside of cotton leaves. This light repels aphids, which are the second most important pest of cotton in Tanzania. CA cotton crops in Paraguay with light coloured crop residues are becoming free of aphids (Lange & Moriya, 2004).

Cotton should be grown in a 2 year rotation with cover and food crops, aimed largely at reducing the pressures of fungal and bacterial diseases.

Cotton varieties grown are UK91 and ILAI90 which are resistant to the diseases encountered. Good plant populations must be planted to ensure early canopy for weed suppression. Cotton seed should be dressed with fungicidal seed dressings. Row-spacings (100cm rows), will ensure satisfactory canopy and allow weeding and insecticide application easier.

Scouting for pests will be used (see section “insect control” in current production Section 3.1.5). Insecticides sprays should only be done when insect pest thresholds, based on cotton scouting, are exceeded. The initial spray using endosulfan is recommended as this has a lesser effect on beneficial insects than pyrethroid insecticides.

Subsequent sprays applying broad spectrum pyrethroid insecticides should be used later in the season, when aphids numbers reach high enough levels to justify the cost of spraying. Application is best done in the morning or evening, when the soils in fields are still cool enough to prevent thermal uplift of sprays, and aids in better penetration into the crop canopy. At these times the relative humidity is higher and reduces the evaporation of spray droplets. Ideally, the difference between the wet and dry bulb should be less then 10C. The ULV plus sprayer applies droplet sizes of between 100-130mm, which with addition of molasses will provide good penetration into the canopy. This is because the molasses limit evaporation. It is used at between 17.5–35% by volume in sprays as follows. The insecticide spray is diluted by 50% with water to which the required amount of molasses (17.5-35%) is filtered and added. This is thoroughly mixed with the spray to which water is added to bring this to the final required spray concentration. Scouting for spraying should commence 8-9 weeks after germination.

Insect control in organic cotton production

Example from Uganda: The production of organic cotton in the Northern region of Uganda is relatively easy. There are few pests or diseases that cannot be controlled easily by natural methods locally available. The farmers in the area are already well acquainted with these methods. There are no yield differences between conventional and organic production.

In the northern cotton producing areas of Uganda there is an excellent predator ant known locally as the "nginingini" (*Lepisiota* spp.). This ant is very active in the cotton fields and it attacks all the normal crawling predators of cotton. The predator ant unfortunately cannot fly and is not effective against cotton stainers. However, a traditional method of control against cotton stainers is to intercrop the cotton with 'malakwang', which seems to attract the cotton stainers away from the cotton and to act as a diversionary crop. Thus the use of chemicals has never really been necessary for cotton production in Northern Uganda. Moreover,

when pesticides are used they eliminate the predator ant population, thereby creating a dependency on the chemicals.

Cotton is traditionally grown in rotation with other crops. Ideally, no cotton is sown after maize or sorghum and no maize or sorghum after cotton. Generally cotton is the first crop planted on fallow land. A normal rotational pattern is as follows:

The two existing organic cotton projects in Uganda have been successful in terms of buying organic produce from farmers at premium prices. The Lango Organic project has marketed over 1,700 tonnes of organic cotton and 500 tonnes of organic sesame since its start in 1994. The younger Outspan project has marketed 21 tonnes of organic cotton and over 600 tonnes of organic sesame since 1998.

Opportunity for organic production of cotton

The CA system of crop production has the potential to "evolve" in the direction of organic farming. Over time, with minimal soil disturbance and the maintenance of surface covers by crop residues and short fallows with legumes as "smother crops", the weeds become less and predators of cotton insect pests increase. A point could be reached where no chemical inputs are used. However, a phased approach commencing with herbicides and fertiliser inputs will be used in order to achieve the targeted increases in seed cotton yields.

7.1.6 Harvesting

No new technologies for harvesting are proposed. The current system of hand harvesting is suited to the scattered small land holdings, which would make machine harvesting highly inefficient. Furthermore, hand harvesting has the potential for ensuring high quality seed cotton.

7.1.7 Cotton destruction

By-laws regulate that cotton plants must be removed and burnt after harvest. This is a sanitary method of reducing risk of bacterial diseases and carryover of insect pests such as pink bollworm and stainers. In the WCGA, this must be completed by 15 September and in the ECGA by 15 December. These dates are two months before the commencement of planting. This is done by hand-hoeing each plant at a depth of 50-80mm below ground level to cut the main stem. Plants are then removed from the field and when dried are burnt. This activity is done in the off-season when pressure on labour is low.

7.1.8 Crop rotations

An ideal crop rotation for cotton would be maize or sorghum-legume-cotton-maize or sorghum-legume-cotton. The legume in this case is grown as a short season fallow, where seeding of the legume is done in the interrow area immediately after flowering of the maize or sorghum. The short season legume utilises late season moisture reserves and will die

when the moisture is depleted. If the green manure does not die from lack of moisture it can be killed using a knife roller shown in Figure 10.

7.2 Gross margin and farmer model

7.2.1 Introduction

The objective of the financial model is to simulate in financial terms the proposed agricultural production potential for the cotton industry as outlined in the previous sections. The first step is to compile gross margins for the selected enterprises. From this, farmer models can be compiled and the different viability of the various enterprises evaluated. Lastly, the cost of establishing the Pilot Project or Demonstration Units is estimated.

7.2.2 Enterprise Gross Margins

The selected enterprises included in the financial model are:

- Cotton
- Maize
- Sorghum

The building blocks of the financial model are the gross margins for the selected enterprises. Gross margins represent income from the sale of the produce, less all direct costs that can be allocated to the production of the specific crop. Generalised production programmes have been compiled for each of the proposed enterprises and indicative gross margins were calculated. The gross margins for each enterprise have been estimated from production plans and include the following assumptions:

- The gross margins are based on an average farmer in the area and attempt to be representative of a typical farming operation in the region. However, in reality, there is a wide range of expertise and experience in farming which results in a wide variation in actual income and costs of enterprises.
- Gross income is based on representative yields and long/medium term prices for the enterprise.
- The prices used for produce is the producer price, however, a portion of the food crop is used for home consumption and would therefore have a higher value than the producer price.
- All deductions from gross income such as market agents' commission are included.
- The gross margin costs include:
  - **input costs** such as seed, chemicals and fertilizer,
  - **mechanical operations** at contract rates such as ploughing and spraying,
  - **water charges and pumping costs**
  - all directly allocated **labour costs** (overhead labour costs such as the farm manager's salary are not included in the gross margin),
  - packaging and transport costs to the market,

- The gross margins show current practises with their respective yields and variable costs and improved practises (detailed in previous sections) with their related yields and costs. It is assumed that as the soils are improved through good agricultural practises the yield will increase on the various enterprises over time; this is included in the gross margin.

The gross margins for the selected enterprises are given in the tables below

Table 13: Gross Margins for Seed Cotton (current versus improved practices)

			Quantity				Amount			
	Units	Unit Price ($)	Current	Improved Year 1	Improved Year 2	Improved Year 3	Current	Improved Year 1	Improved Year 2	Improved Year 3
Income										
Seed Cotton	kg/acre	0.28	283	607	809	1,012	79	169	225	281
Total Income							**79**	**169**	**225**	**281**
Variable Input Costs										
Seeds	kg/acre	0.11	12	10	10	10	1	1	1	1
Fertilizer										
Urea	kg/acre	0.26	-	26	26	26	-	7	7	7
TSP	kg/acre	0.35	-	13	13	13	-	5	5	5
Manure	kg/acre	0.88	1	3	1	1	1	2	1	1
Pesticides	3 sprays	4.41	2	4	4	4	9	18	18	18
Herbicide glyphosate	$/litre	4.48	-	1	1	1	-	5	5	5
Mechanical Operations										
Tractor	$/acre	-	-	-	-	-	-	-	-	-
Animal Traction Rip on row	$/acre	18.76	-	0.25	0.25	0.25	-	5	5	5
Animal Traction No-till planter	$/acre	35.77	-	1	1	1	-	36	36	36
Transport	$/km	1.76	1	4	4	4	1	7	7	7
Labour Costs										
Land Preparations	Manday/acre	0.62	8	1	1	1	5	0.5	0.5	0.5
Knapsack spray herbicide	Manday/acre	0.62	-	0.2	0.4	0.4	-	0.1	0.2	0.2
Maure Applictaion	Manday/acre	0.62	1	2	2	2	0	1	1	1
Sowing	Manday/acre	0.62	2	-	-	-	1	-	-	-
Fertilizer Application	Manday/acre	0.62	-	4	4	4	-	2	2	2
Weeding and Gap Filling	Manday/acre	0.62	9	2	2	2	6	1	1	1
Pesticide Application	Manday/acre	0.62	0	1	1	1	0	0	0	0
Harvesting	Manday/acre	0.62	6	8	10	12	3	5	6	7
Tranpsort and Selling	Manday/acre	0.62	2	2	2	2	1	1	1	1
Unprooting and Buring Stalks	Manday/acre	0.62	2	2	2	2	1	1	1	1
Total Variable Costs							**31**	**99**	**99**	**100**
Gross Marigin							**48**	**70**	**126**	**181**

From the above it can be seen that the variable costs for cotton increase from $30/acre to $100/acre, a net increase of $70/acre. This is a huge increase for the resource poor farmers and therefore the improvement programme is dependent on him getting access to credit for this increase in input costs. The increase in input costs is more than compensated for by nearly a four fold increase in gross profit.

Table 14: Gross Margins for Maize (current versus improved practices)

			Quantity				Amount			
	Units	Unit Price ($)	Current	Improved Year 1	Improved Year 2	Improved Year 3	Current	Improved Year 1	Improved Year 2	Improved Year 3
Income										
Maize	kg/acre	0.16	526	1,214	1,416	1,619	84	193	225	257
Total Income							84	193	225	257
Variable Input Costs										
Seeds	kg/acre	0.44	8	8	8	8	4	4	4	4
Fertilizer										
Urea	kg/acre	0.26	-	61	61	61	-	16	16	16
TSP	kg/acre	0.35	-	40	40	40	-	14	14	14
Manure	kg/acre	0.88	1	3	3	3	1	2	2	2
Storage pesticides (Actelic dust)	100gm/bag	0.88	5	16	16	16	5	14	14	14
Herbicide glyphosate	$/liter	4.48	-	1	1	1	-	5	5	5
Mechanical Operations										
Tractor	$/acre	-	-	-	-	-	-	-	-	-
Animal Traction Rip on row	$/acre	18.76	-	0.25	0.25	0.25	-	5	5	5
Animal Traction No-till planter	$/acre	35.77	-	1	1	1	-	36	36	36
Transport	$/km	1.76	1	10	10	10	2	18	18	18
Labour Costs			-	-	-	-				
Land Preparations	Manday/acre	0.62	2	0.4	0.4	0.4	1	0.25	0.25	0.25
Knapsack spray herbicide	Manday/acre	0.62	-	0.2	0.2	0.2	-	0.12	0.12	0.12
Maure Applictaion	Manday/acre	0.62	1	1	1	1	0	1	1	1
Sowing	Manday/acre	0.62	1	-	-	-	1	-	-	-
Fertilizer Application	Manday/acre	0.62	-	4	4	4	-	2	2	2
Weeding and Gap Filling	Manday/acre	0.62	3	2	2	2	2	1	1	1
Second Weeding	Manday/acre	0.62	3	1	1	1	2	0	0	0
Harvesting	Manday/acre	0.62	2	6	8	10	1	4	5	6
Threshing	Manday/acre	0.62	3	6	8	10	2	4	5	6
Packaging	Bags	0.18	5	17	17	17	1	3	3	3
Total Variable Costs							22	130	132	135
Gross Marigin							62	63	93	123

For maize, the increase in input costs is over six fold with a net increase of $113/acre. This results in a doubling of income from $62/acre to $123/acre.

Table 15: Gross Margins for Sorghum (current versus improved practices)

			Quantity				Amount			
	Units	Unit Price ($)	Current	Improved Year 1	Improved Year 2	Improved Year 3	Current	Improved Year 1	Improved Year 2	Improved Year 3
Income										
Sorghum	kg/acre	0.10	283	1,012	1,214	1,416	27	97	116	135
Total Income							27	97	116	135
Variable Input Costs										
Seeds	kg/acre	0.31	2	2	2	2	1	1	1	1
Fertilizer										
Urea	kg/acre	0.26	-	40	40	40	-	11	11	11
TSP	kg/acre	0.35	-	7	7	7	-	3	3	3
Manure	kg/acre	0.88	1	-	-	-	1	-	-	-
Herbicide glyphosate	$/liter	4.48	-	1	1	1	-	5	5	5
Storage pesticides (Actelic dus	packets/acre	0.88	3	6	6	6	2	5	5	5
Mechanical Operations										
Tractor	$/acre	-	-	-	-	-	-	-	-	-
Animal Traction Rip on row	$/acre	18.76	-	0.3	0.3	0.3	-	5	5	5
Animal Traction no-till planter	$/acre	35.77	-	1	1	1	-	36	36	36
Transport	$/km	1.76	1	2	2	2	1	3	3	3
Labour Costs			-	-	-	-				
Land Preparations	Manday/acre	0.62	4	0	0	0	2	0	0	0
Knapsack spray herbicide	Manday/acre	0.62	-	0	0	0	-	0	0	0
Maure Applictaion	Manday/acre	0.62	2	-	-	-	1	-	-	-
Sowing	Manday/acre	0.62	0	-	-	-	0	-	-	-
Fertilizer Application	Manday/acre	0.62	-	4	4	4	-	2	2	2
Thinning and gap filling	Manday/acre	0.62	2	4	4	4	1	2	2	2
Bird Scaring	Manday/acre	0.62	-	9	9	9	-	5	5	5
Weeding and Gap Filling	Manday/acre	0.62	6	2	2	2	3	1	1	1
Second Weeding	Manday/acre	0.62	4	1	1	1	2	0	0	0
Harvesting	Manday/acre	0.62	3	6	8	10	2	4	5	6
Threshing	Manday/acre	0.62	4	6	8	10	2	4	5	6
Packaging	**Bags**	**0.1762684**	**3.642250101**	**5.665722**	**5.665722**	**5.6657224**	**1**	**1**	**1**	**1**
Total Variable Costs							22	89	91	94
Gross Marigin							5	8	25	42

In the case of sorghum, the increase in input costs is significant, however, the viability of the crop is taken from being financially marginal to being a viable enterprise to produce.

The overall viability of increasing the input costs on these enterprises over time will now be looked at using the farmer models.

7.2.3 Farmer Models

From the gross margins above typical farmer models are compiled. The two models are:

- Cotton/maize model
- Cotton/Sorghum model

7.2.4 Main Assumptions of Farmer Models

From the information given an overall model can be compiled that simulates, in financial terms, the production of the farm. The main assumptions for the financial analysis are listed below:

- The financial analysis is undertaken over a 10 year period.
- The average size farm is six acres in extent
- The financial analysis is done in constant 2007 dollar values (therefore projected inflation is not included in the model and the estimated returns should be seen as real returns).
- The cost of land and existing infrastructure is not included.
- Income and production costs are derived from the gross margin estimates.
- The financial analysis does not include any financial costs (i.e. interest charges).
- Working capital for each operation has been estimated and included as a capital cost in the financial analysis.

Production Programme and Gross Margin

Each farmer on average grows two acres of cotton and four acres of a staple food crop (maize or sorghum).

Overhead Costs

A provision for overhead costs has been estimated for and is included in the analysis. A provision of $80 per annum is included in the model. This is a provision for and costs that are not included in the gross margin Capital Costs. The capital requirement (infrastructure and equipment) has been included in the model. For the purposes of this analysis it is assumed that all planting equipment is hired and a provision is made for small tools (e.g. knapsack sprayer, hoe, spade etc) of $350.

7.2.5 Cotton/Maize Farmer Model

A summary cash flow analysis of a cotton/maize farm is given in

Table 16

Item/Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Total Revenue Enterprises	1110	1351	1592	1592	1592	1592	1592	1592
Less Production Costs	717	727	739	739	739	739	739	739
Gross Margin	393	624	853	853	853	853	853	853
Less Overhead Costs	80	80	80	80	80	80	80	80
Operating Cash Flow	313	544	773	773	773	773	773	773
Less Capital Costs								
Infrastructure	0	0	0	0	0	0	0	0
Equipment	350	0	0	0	0	350	0	0
Working Capital	430							
Net Cash Flow	-468	544	773	773	773	423	773	773
IRR (over 20 years)	136%							

Table 16: Summary cash flow analysis of a cotton/maize farm

From the financial analysis it can be seen that only in the first year does the farmer have a negative cash flow which highlights the requirement for access to credit. The main reason for the negative cash flow is because of working capital requirement of $430 to buy the initial inputs for cotton and sorghum. The cash flow before finance costs shows a very high internal rate of return as the cost of land is not included in the analysis.

The internal rate of return for the cotton/maize farm given the above assumptions is 136% (excludes the cost of land and finance)

7.2.6 Cotton Sorghum Farm Model

A summary cash flow analysis of a cotton sorghum farm is given in Table 17.

Table 17 : Summary cashflow analysis of a cotton/sorghum farm

Item/Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Total Revenue Enterprises	724	914	1103	1103	1103	1103	1103	1103
Less Production Costs	553	563	575	575	575	575	575	575
Gross Margin	170	351	528	528	528	528	528	528
Less Overhead Costs	80	80	80	80	80	80	80	80
Operating Cash Flow	90	271	448	448	448	448	448	448
Less Capital Costs								
Infrastructure	0	0	0	0	0	0	0	0
Equipment	350	0	0	0	0	350	0	0
Working Capital	332							
Net Cash Flow	-592	271	448	448	448	98	448	448
IRR (over 20 years)	61%							

As with the maize/cotton model the first year shows a negative cash flow as a result of the working capital requirement. The farmer model is less profitable than the maize/cotton model, however, this will depend on the relative price difference between maize and sorghum over time.

8 METHODS TO IMPROVE GINNING EFFECTIVENESS AND EFFICIENCY

The primary activity to improve the effectiveness and efficiency of ginning in Tanzania revolves around the refurbishment of gins. The upgrading of gins and the upkeep and management of the ginning facilities, will go a long way to reducing the contamination of the lint and improving the prices for lint secured by the gins

While the TCB monitors and gathers data on the quality and classes of lint exported, this is not extended to the local trade in lint. A stringent programme of cotton grading and classing associated with price differentials for the various grades will allow gins to realise returns on capital invested in upgrading the facilities. This will, however, also require a feedback mechanism to gins on the quality and grades of their lint from the Laboratory. Alternative gin-based testing facilities (as is being considered in the USA) should be implemented. This would, however, require standards to be developed for testing and grading of lint and a strict monitoring system that ensure that gin-based facilities adhere to these requirements.

The implementation of a mutually beneficial relationship between growers and the gins would also ensure that the gins can accurately predict both the volume and the quality of seed cotton available in the coming ginning season. This to some degree would bring back elements of the old zoning system.

9 PROPOSED BUSINESS MODEL FOR FARMERS LINKED TO COTTON DEVELOPMENT AGENCY

A number of different approaches to development in rural areas have been explored in Africa. Concerns over the earlier approaches relate to exploitation of local people and their resources to benefit minority external interests. Mindful of this serious limitation associated with past approaches, investigations were made into contemporary business ventures in successful rural areas in other sectors. On the basis of this experience a range of possible development approaches have been identified.

9.1 Farmer requirement

These development approaches should be used in the development of viable agricultural businesses. It is important to realise that there is a range of different farmers that need to be included in the development process. These include:

- non-commercial farming
- commercial farmers
- co-operative/association structures, and
- market-led out-grower schemes

These are briefly discussed below:

9.1.1 Non-commercial farming (Production for home use)

Non-commercial farming has been identified as a form of agriculture currently practised by the majority of farmers in Tanzania.

However, it does not present a realistic option for commercial development since it will not realise the full potential of the resources. The reasons for this are:

- differing objectives inherent in subsistence versus commercial production;
- inherent inefficiencies in management;
- limited knowledge about high value crops (production and markets);
- lack of local skills;
- lack of capital and loan funding;
- limited access to inputs and markets; and
- lack of reliable transport and support service and infrastructure.

9.1.2 Commercial Farmers (current and potential)

Those individuals, who have access to finance and who are experienced in farming and wish to build a commercial farming operation, should have the opportunity to begin their own operations. This development approach needs to focus on those aspirant farmers who wish to undertake commercial farming.

Advantages:

- Flexible to consider the individual's farming aspirations.
- Can consider business opportunities that are viable at a small, intensive scale.
- Smaller ventures can be considered.
- Not dependent on monoculture farming ventures already established.

Disadvantages:

- High risk because there is no shared learning structure.
- High dependency on one-on-one extension support at start-up
- Cannot learn from local experience in many instances.
- Relies on new and untested crops.
- Poor training and technical support.
- Poor business administration and labour management.

9.1.3 Co-operative/Association farming structures

In the co-operative/association model, farmers organise themselves into co-operatives or farming associations and engage in general farming activities as a group. The degree of co-operation of the farmers can range from low-level co-operation activities like sourcing of inputs or joint marketing through to total co-operation where the running of the day-to-day farming is done as a group.

Advantages:

- Aspirant farmers engage in group learning and shared experiences.
- Group buying of inputs and joint marketing of products.
- Transfer of technology is effective because of groups.
- Share strengths such as management, administration, labour, etc.
- Access to finance is easier as a group.
- Structured extension support based on a few specialised crops and one business model.
- Group buying, processing and selling.

Disadvantages:

- Some 'free-riders' in the group can jeopardise the co-operative.
- Group can hold back certain individuals.
- Difficult to manage.
- Poor farmer selection.

- Poor training and technical support.
- Poor business administration and labour management.
- Poor business management.

9.1.4 Out-grower schemes

Out-grower schemes involve the establishment of a core estate, central processing or marketing company with farming groups, individuals and companies supplying to this company. This option is based on an investor who will be prepared to invest in the project and in doing so facilitates development and supplies operating capital as well as financial, technical and management expertise. The investor has direct control over production in the core estate thereby reducing risk on investment. The core estate option would allow for the establishment and provision of support to out-growers on a market-led basis, thereby overcoming some of the main disadvantages associated with out-grower schemes.

This option has been successfully implemented in a number of enterprises such as sugar.

Advantages:

- Aspirant farmers engage in group learning and shared experiences.
- The marketing issues have been solved and farmers can concentrate on farming.
- Transfer of technology is effective because it is based on a few crops.
- Share strengths such as management, administration, labour, etc.
- Able to access finance based on the scheme structure.
- Easier access to finance as a group
- Credible marketing/ processing company can enhance farm viability.
- Structured extension support based on a few specialised crops and one business model.
- Group buying, processing and selling.

Disadvantages:

- Locked into a commitment to farming one type of crop.
- Risk in that business viability would be based on only one or two crops.

9.2 Development requirement

For all the above opportunities, the following minimum preconditions should be in place:

- An environment needs to be created within which investors and local people identify and support common goals and objectives in pursuing development opportunities.
- Local authority structures acknowledge the benefits of this approach to development and promote the establishment of an appropriate environment for investment.
- Provincial and local governments assume responsibility for establishing an enabling environment (policy, financial support, institutional arrangements and provision of

infrastructure such as roads) conducive to this type of development at a local level. A major commitment in terms of training is needed to ensure an understanding of the concepts and principles involved. A commitment to on- going problem solving will be required for a number of years.

- Willingness by local people to relinquish real and/or perceived rights to land in lieu of office income generating opportunities.
- Government making a substantial capital investment in the project.
- Government and/or the private sector making adequate provision for support services to small-scale producers and out-growers.
- Loan capital is available from recognised financial institutions for out-growers and small-scale producers.
- An accessible and stable market must exist, or the potential must exist to develop such a market.
- A mechanism is set in place to ensure that a proportion of the following benefits are transferred to local people to ensure their benefit from the utilisation of their resources. The benefits could include:
  - grant financing from government
  - percentage of return from farmers and/or farming operation
  - employment opportunities
  - skills transfer
  - out-sourcing of selected services to local contractors.

9.2.1 Proposed Development Model

A flexible approach to agricultural development, whereby a variety of business models can be implemented, while at the same time ensuring that the above preconditions are considered in the design phase, is proposed.

It is recommended that a CDA should be established that is capable of accommodating the variety of development opportunities and business models outlined in the previous section.

This development agency should have well-trained staff with the capacity to oversee and facilitate all development opportunities outlined. This body must be capable of guiding prospective farmers in setting up farming businesses along sound development strategies. It should also have the capacity to give technical support.

There is a need to develop in an ordered and co-ordinated fashion and therefore clear guidelines on the various development strategies should be laid out. This body would co-ordinate the phasing of the development and would be responsible for developing evaluation criteria that would incorporate all role-players into the development strategies.

The integration and implementation of the kaleidoscope of development needs requires a systematic analysis of the underlying development needs. For such an approach, the first step is to identify the components of a successful development scheme. Figure 11 provides a simplistic representation of these components.

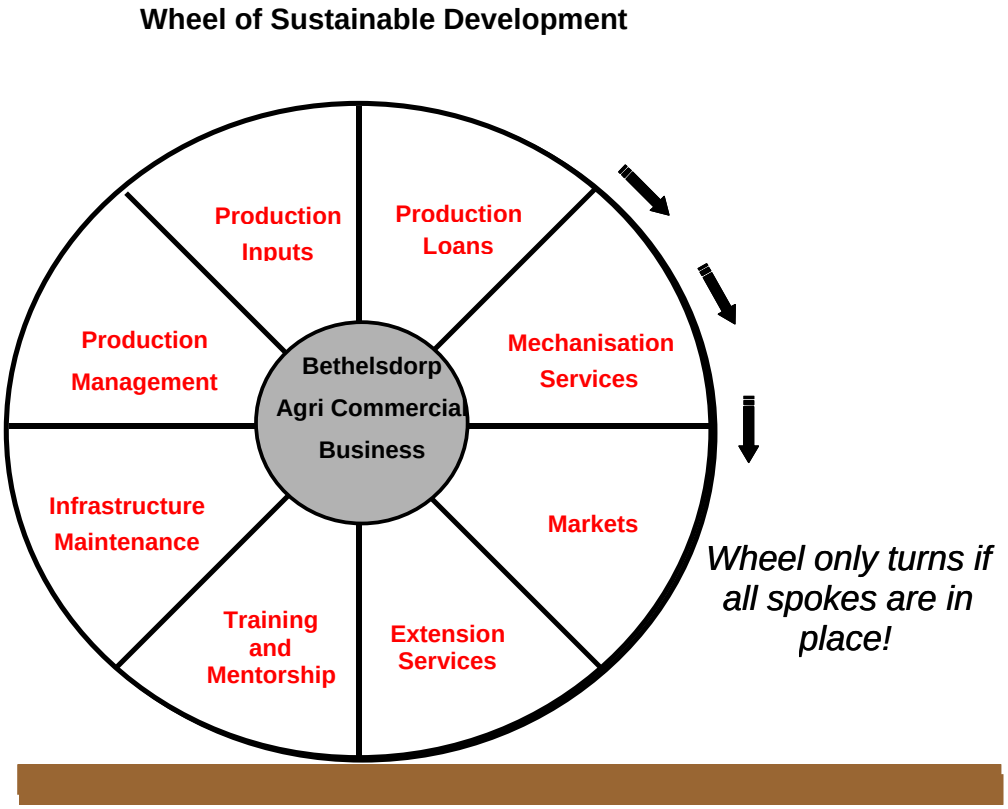


Figure 11: Wheel of Sustainable Development

During implementation it is critical that each of the 'spokes of the wheel of sustainable development' is designed and implemented. This must happen in a co-ordinated fashion according to a very well planned schedule so that each of the critical development components are in place by the end of the development process.

9.2.2 Infrastructure establishment and maintenance

The supply of infrastructure is the most obvious aspect and occurs first in the wheel of sustainable development. However, once this infrastructure is established, it must be maintained in order to ensure continued operation. The respective government departments will maintain infrastructure such as district roads, etc. Training in the planning and operation of maintenance programmes is required in order to enhance the project success.

9.2.3 Irrigation management (where applicable)

In regard to irrigation schemes which are planned in ECGA, all irrigation system's water supply must be equitable and reliable to all users. This requires effective training in:

- Water use by the farmer in terms of irrigation scheduling and crop production
- Operation and maintenance of the water supply system
- Monitoring of water use and return flows

- Detecting water losses

Sustainability of the irrigation system is enhanced since water would be used efficiently, thus reducing overall water costs.

9.2.4 Production inputs

Participants of the initiative must have access to inputs such as seed, fertilisers and chemicals for their annual farming operations.

9.2.5 Production loans

Access implies both availability of the inputs and the ability of farmers to purchase these inputs. In order to achieve this, most farmers require loan facilities for their input costs. This is critical to emerging farmers since they have little or no access to operating capital. Co-operatives or groups often provide a means to purchase inputs on credit.

9.2.6 Mechanisation services

Certain activities, such as ploughing and land preparation, require the use of machinery. Small farmers generally, and emerging farmers in particular, cannot justify the purchase of such large and expensive equipment. If alternative arrangements are not made, then the lack of this type of machinery could jeopardise the sustainability of the project. An option is that the project must identify local entrepreneurs who can effectively provide contractor services.

Animal traction no-tillage planters, rippers, and knapsack sprayers for applying herbicides and insecticides and ULV spinning disc applicators for insecticides could be shared by groups of farmers operating through their FFS. As mentioned in Section 2.2.4 above, TCB and TCA have plans to encourage mechanisation services for farmers, initially for land preparation. TCA members, mainly ginning companies, have recently ordered and import 100 tractors for offering mechanisation to farmers. The TCA aims to modernize cotton farming. Under the TCA mechanisation strategy, for no-till production under CA, pre-plant spraying of Roundup would be done using tractor-mounted herbicide sprayers fitted with 12m spray booms. Planting would be done using special no-till planters that fertilise and directly sow the seed into the soil. Initial insecticide sprays could be applied to small-holder's cotton either using tractor mounted sprayers or by farmers using hand-held ULV plus sprayers to which would be added molasses to improve spray deposits in the crop.

9.2.7 Markets

Market development is critical to the sustainability of the development. It begins with a clear understanding of the fundamentals of marketing. Farmers must undergo basic training in this regard in order to grasp the important role that it plays in the overall viability of the

farming enterprise. A thorough investigation into the market potential for each proposed crop is critical.

Following on from this, a simple and clear plan must be drawn up to access this potential. Market development is a continual process that occurs out of season as well as in season. It is seen as a very important item, and at start-up, marketing support must be provided as a focus to the farmers. Once relationships with marketing agents and buyers are successfully established, the farmers will no longer require focused support in this field.

9.2.8 Extension services

Extension support to farmers should be based on the crops being grown. General extension in terms of fertilisation, chemicals, etc. is effective, however, farmers require expert advice that is relevant to the crops they are growing.

9.2.9 Training and mentorship

During the implementation stage, farmers require focussed support in terms of training and mentorship. Once the farmers are up and running, the daily farming activities take priority and farmer support shifts from that of a mentorship programme to an extension service.

9.3 Institutional arrangements - development agency

In order for the proposed development to be successfully implemented, it is proposed that a development agency be established to fulfil the role of development agent. The aim of this development agent will be to introduce a fresh and innovative approach to development by using unique sociological and participatory approaches to facilitate economically, environmentally and socially sustainable development.

9.3.1 Objectives of the development agency

The development agency would have three broad objectives:

- to create an enabling environment for the development to take place;
- to promote the establishment of community-led business opportunities; and
- to ensure farmer support services are in place.

A suggested name for this authority would be the CDA.

In order to achieve these objectives, CDA must place particular emphasis on capacity building and training that is designed and customised to the needs of the participants.

The CDA should ensure that development takes place in a sustainable manner and pace without losing its focus on implementation and farming business development.

It is proposed that the CDA be set up as a short-term local development organisation. It is envisaged that this organisation should operate throughout the establishment and development of the proposed project, and also for a short period after implementation is complete. This extra period after implementation is proposed in order to ensure a smooth transition to the successful establishment of the farming operations initiated during implementation.

The CDA would be made up of two parts: an executive structure and an operational structure. Figure 12 presents both the executive and operational structures of the CDA. The two structures are discussed in detail in the following two sections:

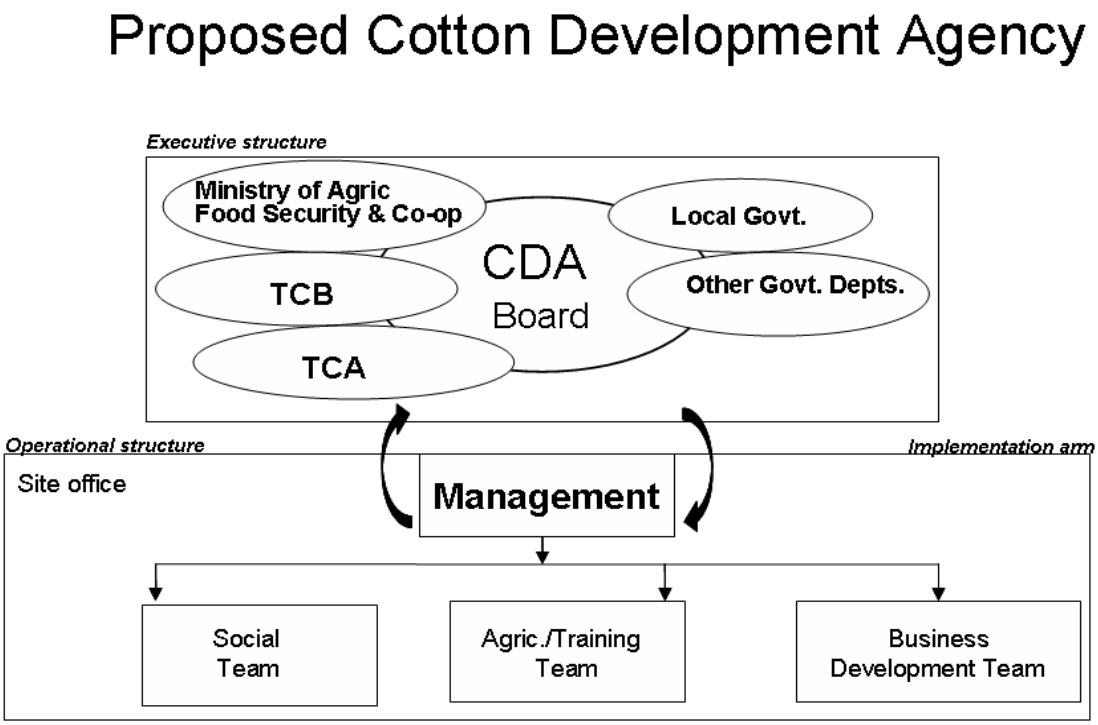


Figure 12: Proposed Cotton Development Agency

9.3.2 Executive structure

It is proposed that the executive structure should consist of a governing board, established with representation from the following role-players:

- Ministry of Agriculture, Food Security and Cooperatives
- Local Government structures
- Local organised business
- TCB
- TCA
- Gin representatives

The role of the board will be to:

- generate and update development and operational policy
- source and manage funding
- generate and oversee operational management tenders
- ratify operational budgets
- continually promote the project.

The day-to-day running of the implementation phase, such as facilitation, farmer identification, training, developing operational guidelines, etc. would be the responsibility of the operational staff.

9.3.3 Operational structure / Implementation arm

The second part of the CDA, the operational structure, is responsible for the ground-level development. This arm will have a field office where the operations facilitator and field teams are located.

The implementation strategy is based on the strength of field training teams and the dynamic relationships that they develop with the aspiring farmers within the development area.

The Social Team's activities precede any interactions between CDA and the farmers. The team ensures equity, understanding and cohesion within the role-players prior to and during all development phases of the business.

The Agricultural Team sets the stage for development through skills transfer and resource mobilisation, and relies on the Social Team's evaluation of role-player dynamics and training requirements. The Agricultural Team provides a mentorship role during farm development and acts as a long-term support service for the newly established farms. They will help farmers adopt new technologies that enhance farming efficiencies.

The Business Development Team helps farmers plan and establish effective farming businesses and management systems.

Constant communication between the teams and the aspirant farmers allows for a participatory, relevant and successful implementation approach to the development process.

- Identification and selection of aspirant farmers and business partners. This involves establishing clear guidelines for the selection process.
- Assistance and technical support in farming business development
- Technical support
- Provision of support services

- Marketing development and training
- Training and capacity building
- Small business development
- Linking in with local existing structures such as development organisations, non-governmental organisations (NGOs), extension services, government extension and support services, etc.

Operations management

It is proposed that a private sector institution that is experienced in participatory approaches to development be used to manage CDA. A site office facilitator is required to oversee the smooth running of the site office. It is envisaged that the site office would be required for all three phases of development and a further two years of operation after implementation is complete. This is to ensure that the newly formed farming businesses are adequately supported during the initial stages of operation.

The management agent will be responsible for training of field staff. The management agent will also be responsible for the development of operational procedures for the field staff. All activities will be conducted according to a strictly controlled budget.

Social team

The Social Team, headed by a staff member from MAFC, is the pathfinder for all CDA teams. It firstly introduces the objectives of Farmer Field School (FFS) approach of the CDA to the aspirant farmers and role-players as well as all interested and affected community members within the proposed development area. The Social Team also ensures that the participants understand that these businesses are about sustainability, equality and efficiency.

The role of the Social Team is:

- Introduce the CDA teams to the aspirant farmers and role-players
- Profiles aspirant farmers and the business objectives
- Addresses equity issues
- Ensures participation by all business owners, irrespective of gender
- Outlines specific needs of each participant
- The Social Team is also responsible for capacity building on social awareness, positive attitude, and understanding of entrepreneurship.

Agricultural/training team

The Agricultural/Training Team is responsible for the transfer of quality information, advice, expertise, organisational methods and resources to farmers. This relates to current agricultural techniques, methodologies, and processes and ultimately assists in the establishment of sustainable farming enterprises.

The role of the Agricultural Team is:

- Ensure the co-operation and participation of local agricultural experts
- Establish training and technology transfer structures for newly formed businesses
- Integrate the research of the training and applied research facility with the needs of the developing business
- Liaise with the training teams and consultants for capacity building
- Provide mentorship to aspirant farmers to allow them to apply what they have learned in the training courses to the development of their farms
- Assist and advise on crop establishment and production methods
- Assist and advise on marketing and quality control in high value crop production
- Foster constructive relationships between newly established farmers and other stakeholders in the industry.

Business development team

The Business Development Team builds capacity and transfers necessary skills to participants in selected business opportunities so that they are able to make informed decisions on how to effectively run and manage sustainable businesses. The team ensures that the aspirant farmers are ready to undertake practical farming activities and meet all the requirements to access loans.

The role of the Business Development Team is:

- Business model selection and understanding
- Business type and constitution training
- Business registration
- Business management and control
- Business and financial planning
- Bookkeeping training
- Farm record keeping and training
- Support services and micro-lending co-ordination

NOTE: An organisation such as Tanzania Gatsby Trust could facilitate the establishment of the Business Development Team, financed out of interest charged on micro-finance loans.

The CDA should also have a small team of specialists who manage the information system that contains all relevant development area data. The basis of this information system will be a GIS which stores, models and cross-links spatial data to facilitate design and planning decisions. This group will also be responsible for the co-ordination and dissemination of project information (posters, notices, newsletters, brochures and progress reports).

Overall Development Structure Figure 13 shows the proposed organisational structure (simplified) of all the stake holders and role players and the linkages between the relevant people and organisations for the proposed development

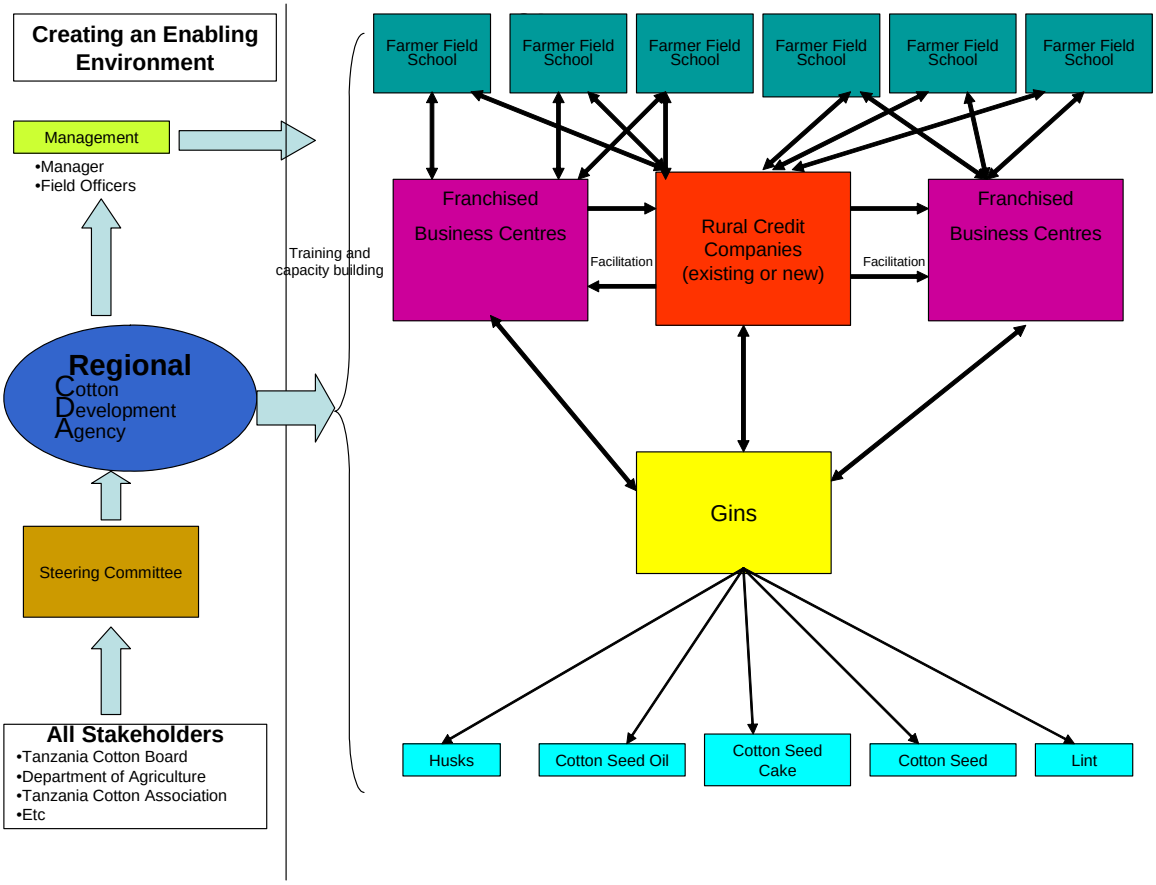


Figure 13: Simplified structure of all the role players

9.3.4 Enabling environment

The most important aspect of the proposed development of the cotton production and ginning components of the value chain is to create an enabling environment in with the development can take place. As discussed, it is proposed that a development agency be created (CDA) in order to facilitate this process. This would be made up of an executive or steering committee which would have representatives from all the main stakeholders. The executive would then give a mandate to the operational structure to implement and facilitate all strategies and policies that have been agreed on. It is envisaged that this organisation would have influence through out the industry value chain from the farmers to the ginners and other value adding industries.

9.3.5 Farmers

At the top of the structure are the farmers themselves. As discussed, there are a number of different types of farmers and each type needs to be included in the development process. From past projects, it is recommended that farmers are encouraged to form groups (these could be the existing Farm Field Schools or new credit groups). The principle is that all the farmers in the group put in a deposit (could use the existing passbook system) to a rural finance company which uses this total group deposit as collateral for individual loans. In other words, if one member of the group defaults on the loan then the whole group will loose their total deposit. This allows for control and accountability within the group and lowers the transaction costs for the rural finance companies.

These small groups can then be used for more efficient training and extension services to the farmers.

9.3.6 Franchised business centres

It is proposed that the current buying centres become franchised business centres and are commercially viable in their own right. They would still be responsible for purchasing cotton and the transport of cotton to the gin, but their range of services would increase. This would include supplying inputs to the farmers and facilitating credit to the farmers through rural credit companies. They could also provide contract mechanisation services to the farmers and facilitate training through the MAFC.

It is envisaged that these Business Centres could be linked to a gin or they could be privately owned. The idea of a franchise is to ensure standardisation of the services offered and to develop these businesses into centres of excellence. It is proposed that the existing system with TCB gives the franchise a licence as a cotton buying centre be contained. The franchise can then be taken away if the minimum requirements are not met i.e. ensuring good grading of cotton.

9.3.7 Rural Credit Company

The biggest constraint to farmers to improve their productivity is the access to credit for production inputs. The CDA will need to work closely with rural credit companies or micro lenders in order for credit to be made available to farmers. It is understood the Tanzania Gatsby Trust is involved in micro lending in Tanzania and therefore has good experience and knowledge in regard to credit to farmers.

Apart from the group lending scheme outlined above there are a number of other programmes that can be used in order to improve the access to credit by the farmers. It is proposed that the CDF administered by the Cotton Board be used to underwrite a portion of the loans to the cotton farmers so reducing the risk of lending for the Rural Credit Companies.

It is vitally important that the Rural Credit Companies work closely with the proposed Franchised Business Centres and the Ginneries in order to reduce risk and to reduce transaction costs.

9.3.8 Ginneries

The importance and role of the ginneries has been outlined elsewhere in this report. The main point here is that they are an important stakeholder in the development initiative and will need to work closely with the other role players.

10 PILOT GROUPS AND DEMONSTRATIONS

10.1 Localities in WCGA and ECGA

A stakeholder's workshop for the WCGA was held in Mwanza on 30 April 2007 and the stakeholder's workshop in ECGA was held in Morogoro on 17 May 2007.

These workshops proposed the following localities for demonstrations of the planned new technologies for cotton production:

Table 18: Proposed localities for demonstrations of new technologies for whole farm systems of cotton and food crops in rotation

Area	Motivation
WGCA	
1. Bunda, in Mara Region	Soils depleted of nutrients, good extension support
2. Kishapu, in Shimyanga Region	Soils depleted of nutrients, good extension support
3. Geita	Copcot ginning company has indicated a willingness to participate in demonstrations in the Geita area
ECGA	
4. In Morogoro Region: Ulanga or Makuyu/ Mvomero or Msowero/Kilosa (to be short listed to one district for ECGA to participate in the project, decided at a workshop of stakeholders, planned for September 2007)	Proximity to Ilonga ARI Criteria: Link to independent player (Private sector) Farmer Field School programme of Ministry of Agriculture, Food Security and Cooperatives Cotton research stations Specialists in the new technologies.

10.2 Components of demonstrations

The demonstration will include new technologies compared to current farmer practice for food crops and cotton. It is proposed that for WCGA the food crop should be sorghum because this crop is more tolerant to dry conditions, whereas for ECGA maize should be planted.

It is recommended that a Pilot Scheme be established that will demonstrate the benefits of the improved agricultural practices to the farmers and so encourage them to adopt the new technologies and agricultural practises.

It is proposed that these demonstration units be set up in four regions with three demonstration units in each region. Each demonstration unit will be 2.5 acres in extent and will consist of the following:

- 0.5 acres of cotton using current farmer practice – control
- 0.5 acres of a food crop using current farmer practice - control
- 0.5 acres of cotton using improved practises
- 0.5 acres of a food crop using improved practice
- 0.25 acres for cotton variety trials
- 0.25 acres for maize/sorghum variety trials

Table 19: Area planted (acres)

Area Planted			
Year	Year 1	Year 2	Year 3
List of Enterprises			
Cotton (Improved)	6	6	6
Maize/Sorghum (Improved)	6	6	6
Cotton Existing	6	6	6
Maize/Sorghum Existing	6	6	6
Trials	3	3	3
Total Area Planted	27	27	27

The proposed layout for each on-farm demonstration is given in Figure 14 below:

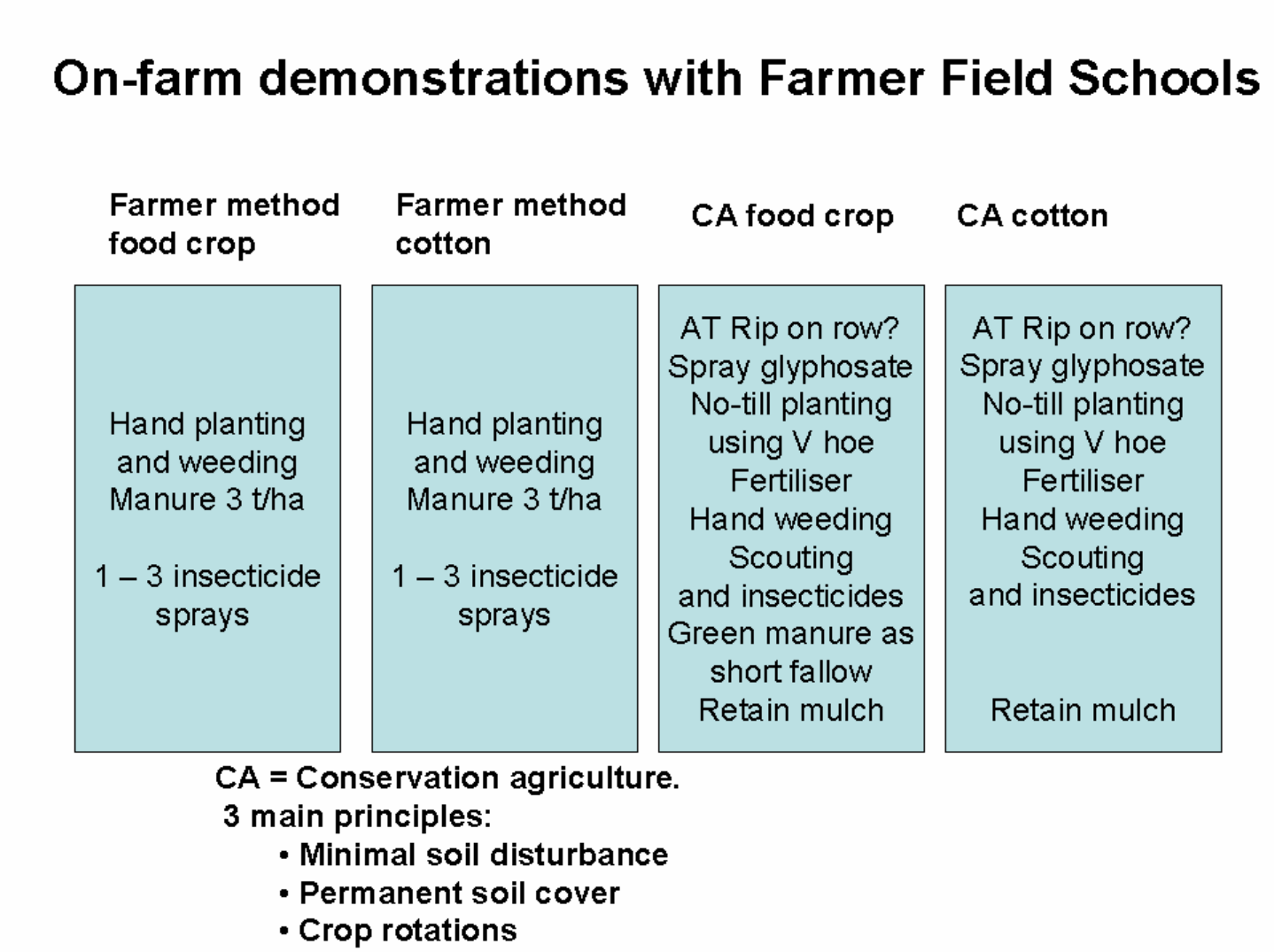


Figure 14: Proposed layout for on farm demonstrations

10.2.1 Traditional system

The traditional system or "Farmer Practice" shown in Figure 14 above involves hand hoeing for land preparation and weed control, and three insecticide sprays. Cattle manure is used to improve soil fertility at a rate of three t/ha.

10.2.2 Proposed new farming systems

The no-till production method used in Conservation Agriculture (described in more detail in Section 7.1) negates the effects of drought, uses less labour and machinery; it reduces erosion and soil compaction and improves water penetration and retention. In general no-till farming leads to sustainable agriculture in the tropics and sub-tropics.

The only extra chemical input in conservation farming is the use of Roundup or glyphosate in the pre-plant control of weeds. Rates of Roundup (360 g/L of glyphosate) are between 3-

5 L/ha depending on weeds to be controlled. Use higher rates for the control of *Cynodon* sp. and *Cyperus* sp. Other than Roundup the insecticide inputs are similar to those used in standard methods of cotton production.

10.2.3 Testing new cotton varieties

In addition to the registered cotton varieties UK91 and ALAI90, other cotton varieties should be investigated and evaluated. In particular, cotton varieties transformed with genes of *Bacillus thuringiensis* (Bt) should be evaluated since these resist a number of bollworm pests including American bollworm. Bt cotton has been widely adopted in Australia, China, India, USA and elsewhere. In sub-Sahara Africa, it is only grown in South Africa, but will soon be grown in other African countries. The Bt gene is not harmful to beneficial insects that would otherwise be killed by "stronger" insecticides. The Bt gene was patented by the company Monsanto, and therefore seed costs for transformed cotton seed are higher than non-Bt cotton varieties. In South Africa Bt cotton produced higher yields than non-Bt cotton on small holder farms and generated more revenue. The seed costs were twice that of non-Bt cotton, but pesticide costs were lower, and less time was spent on the application of insecticides. Spraying, however, is still required for secondary pests such as aphids and stainers. In the USA, chemical spraying was reduced from five sprays to 0.8 sprays when Bt was introduced, and cotton yield improved.

Bt-cotton should be sourced through the company Monsanto, possibly in South Africa, Zimbabwe or Australia.

Other than Bt-cotton, non-transformed varieties from South Africa, Zimbabwe and possibly Australia should be included in evaluations.

All of the suggested varieties should be tested at local research stations and demonstrated in the pilot field demonstrations.

10.2.4 Phasing of project (project life-cycle)

The project including its demonstrations should be planned as show in Table 20 below:

Table 20: Phasing of demonstrations

Year/s	Activity
1	Set up site offices for CDA (this will use an office of either TCB or Ministry of Agriculture, Food Security and Cooperatives (MAFC), one in WCGA and one in ECGA. Source stores for machinery and inputs in villages serving clusters of demonstrations. Management agent responsible for sourcing representative from key cotton sector stakeholders, including social facilitator from MAFC experienced in the Farmer Field School (FFS) approach, training of field staff, and development of operational procedures for project staff. Management agent to ensure expenditure is against that budgeted for the project.

1 -3	Sourcing of production inputs and machinery, including suitable hybrids of maize and sorghum, and cotton varieties. Demonstrations of new farming technologies for cotton and food crops, and variety trials conducted in 3 or 4 regions (depending on funding available). Encourage farmers to remain in the projects because the benefits of Conservation Agriculture take time to be realised, such as reduction of weeds and increase in predators of cotton insect pests
2 - 5	Encourage participation by village credit supply instruments. Surplus production of food crops by farmer groups will provide cash flow for savings and loans.
4 - 5	Site office continues operation, at TCB or MAFC cost, following implementation of first 3 years, to provide support to newly formed farming businesses

10.3 Project staff

The project staffing should rely on short-term specialists familiar with Conservation Agriculture methods for producing cotton and food crops of maize and sorghum, and green manure legumes. One CA specialist should be appointed on contract for implementing the demonstration in WCGA over the period mid-November to mid-December and another or the same specialist used in ECGA over the period mid-February to mid-March over a three year period. Follow up visits should be scheduled for WCGA over two weeks starting in the first week of February in WCGA and the first week of June in ECGA.

10.3.1 Recruiting

Recruiting of project staff should start as soon as possible after acceptance of the Final Report in view of planting in WCGA over mid-November to mid-December. GAA's proposal to Gatsby Charitable Foundation indicated a need to set aside budget for conducting the demonstrations in the first year.

10.3.2 Local co-ordinators and other team members

Representatives from key stakeholder groups involved in cotton production in Tanzania should be encourage to participate in, or at least visit the project and its demonstrations during the growing seasons. The CA specialists should work closely with scientists from Ukirigura and Ilonga ARI. The cotton agronomist at Ukiriguru, Mr Robert Kileo, has indicated a willingness to participate in the demonstrations in WCGA, and Mr Faraha Mrosso, entomologist at Ilonga ARI, has indicated a willingness to participate in the demonstrations in ECGA.

The workshop of stakeholders planned for September 2007, at which the report will be tabled, should be used as an opportunity to introduce the demonstrations and to call for steering committee members from cotton stakeholders such as TCB, TCA and TACOGA and input suppliers for serving on the Cotton Demonstrations Working Group. It is proposed that TCB representatives could be drawn from TCB extension officers stationed in

Shinyanga and Mara regions. The Extension Department of the Ministry of Agriculture, Food Security and Cooperatives was visited in Dar es Salaam in May 2007, and has expressed commitment to using their existing Farmer Field Schools (FFS) programme as a tool to rapidly disseminate the new production technologies to be used for the cotton and food crops. The FFS method is described briefly in the box below:

The **Farmer Field School** is a form of adult education, which evolved from the concept that farmers learn optimally from field observation and experimentation. It was developed to help farmers tailor their Integrated Pest Management (IPM) practices to diverse and dynamic ecological conditions.

In regular sessions from planting till harvest, groups of neighbouring farmers observe and discuss dynamics of the crop's ecosystem. Simple experimentation helps farmers further improve their understanding of functional relationships (e.g. pests-natural enemy population dynamics and crop damage-yield relationships). In this cyclical learning process, farmers develop the expertise that enables them to make their own crop management decisions. Special group activities encourage learning from peers, and strengthen communicative skills and group building. A detailed description of the Farmer Field School approach is given by Pontius et al (2002).

IPM Farmer Field Schools were started in 1989 in Indonesia to reduce farmer reliance on pesticides in rice. Policy-makers and donors were impressed with the results and the programme rapidly expanded. Follow-up training activities were added to enhance community-based activities and local program ownership. Eventually, IPM Farmer Field School programs for rice were carried out in twelve Asian countries and gradually branched out to vegetables, cotton and other crops. From the mid-nineties onwards, the experience generated in Asia was used to help initiate IPM Farmer Field School programmes in other parts of the world. New commodities were added and local adaptation and institutionalisation of these programs was encouraged. At present, IPM Farmer Field School programs, at various levels of development, are being conducted in over 30 countries worldwide.

These diverse programs have generated a variety of data on the impact of the IPM Farmer Field School. Such data generally are presented in project reports that have a limited circulation. Impact studies that are published in official literature tend to focus on specific aspects of impact. Impact studies varied in focus, approach, methodology and robustness. Some lack description of methods. The nature of impact studies typically varies with the developmental stages of programmes. Pilot projects often compared pesticide use and yields or profits of field plots grown with IPM practices and those under regular farmer practice, to demonstrate the merit of the approach. More advanced projects evaluated the adoption of IPM practices, studied expertise or recorded the developmental impacts resulting from farmer empowerment.

10.3.3 Costing of demonstrations

These demonstration units will be done on existing farmers land with all input costs paid for by the project but with the income going to the farmer whose land is being used.

Table 21: Projected Revenue and Production costs of Demonstration Units

Year		Year 1	Year 2	Year 3
Revenue				
	Cotton (Improved)	1,013	1,351	1,689
	Maize/Sorghum (Improved)	1,158	1,351	1,544
	Cotton Existing	473	473	473
	Maize/Sorghum Existing	502	502	502
	Trials	579	579	579
	Sub-total	3,725	4,256	4,787
Production Costs				
	Cotton (Improved)	596	595	603
	Maize/Sorghum (Improved)	778	792	807
	Cotton Existing	187	187	187
	Maize/Sorghum Existing	132	132	132
	Trials	389	389	389
	Sub-total	2,082	2,096	2,118
Farm Gross Margin		**1,643**	**2,160**	**2,669**

The capital costs for the demonstration units would consist of the following

Table 22: Capital costs for the demonstration units

Item	No	Unit Cost ($)	Total ($)
Knapic AT No-till planter	1	2429	2429
Magoye ripper	1	457	457
Knapsack sprayer	3	93	279
Ulva Plus sprayer	3	171	514
V hoe+handle	3	9	26
Motor Cycle	1	5000	5000
Total for each region			8704
Total for four regions			34817
Vehicle for project			28000
Total			62817

In regard to overhead costs, it is envisaged that existing facilities of the TCB or Ministry of Agriculture, Food Security and Cooperatives will be used. The demonstration unit will

require a project leader, which will only be required during the critical periods, and field officers who will undertake the day to day operations of looking after the demonstration plots. These field officers could be existing staff of the cotton board or the Ministry of Agriculture.

Table 23: Overhead costs

Item/Year		**Year 1**	**Year 2**	**Year 3**
	Unit Cost/annum			
Staff Salaries				
Project Manager (GAA)	50,000	50,000	50,000	50,000
Field Officer (EXISTING STAFF)				
Labour (included in gross margin				
Sub Total Salaries		50,000	50,000	50,000
Administration Costs				
Accounting Services	2,000	2,000	2,000	2,000
Research Trials	5,000	5,000	5,000	5,000
Insurance		2,000	2,000	2,000
Management/Consultancy Fee	80,000	80,000	80,000	80,000
Specialist Support Consultants (SSC)	60,000	60,000	60,000	60,000
Travelling and accommodation costs (SSC)	14,000	14,000	14,000	14,000
Travelling costs Stakeholders	18,000	18,000	18,000	18,000
Licences	1,000	1,000	1,000	1,000
Bank Charges	1,000	1,000	1,000	1,000
Telephone	6,000	6,000	6,000	6,000
General Maintenance		2,500	2,500	2,500
General Fuel (vehicle, tractor, etc)	36,000	6,000	6,000	6,000
Miscellaneous (5%)		1,975	1,975	1,975
Total Overhead Costs		**249,475**	**249,475**	**249,475**

11 REFERENCES

Lange, D & Moriya, K., 2004. Conservation agriculture cotton for smallholder farmers. Experiences from Paraquay. FAO and GTZ Collaborative Research technical paper, Paraguay.

Pontius, J.C., R Dilts & A,. Bartlett (2002) From farmer field school to community IPM: Ten years of IPM training in Asia. RAP/2002/15, FAO Regional Office for Asia and the Pacific, Bangkok. 106pp.

APPENDIX A

INSECTICIDES REGISTERED FOR USE IN TANZANIA

LIST OF PESTICIDES RECOMMENDED FOR USE ON COTTON

NAME OF INSECTICIDE		FORMULATION	APPLICATION RATE g.a.i/ha	DATE RECOMMENDED	PESTS CONTROLLED
COMMON	TRADE				
1. Endosulfan	Thiodan	25% ULV *	625	October,1972	ABW,SBW,Aphids(Moderate control) Lygus, and Helopeltis
2. Endosulfan	Thionex	25% ULV*	625	October,1974	
3. Permethrin	Ambush	5% ULV*	125	October,1981	ABW,(SBW),Aphids,Jassids,(Lygus),(Helopeltis), Dysdercus,(Calidea)
4. Permethrin	Ambush	25% EC **	75		
5. Cypermethrin	Ripcord	1.8 % ULV*	45	October,1988(E), October,1984(W)	(ABW,SBW,Aphids,Stainers-moderate control,Calidea-moderate control,Jassids,Lygus,Helopeltis-moderate control)
6. Cypermethrin	Polytrin	1.8% ULV*	45	October,1989(E)	
7. Cypermethrin	Cypaz	1.8% ULV***	45	October,1986(W)	
8. Cypermethrin	Melcypermethrin	1.8% ULV***	45	October,1990(W)	
9. Cypermethrin	Sherpa	1.8% ULV***	45	October,1989(W)	
10. Cypermethrin	Pyrexcel	1.8% ULV***	45	October,1989(W)	
11. Cypermethrin	Nurelle	1.8% ULV**	45	October,1989(E)	
12. Cypermethrin	Cymbush	1.8% ULV**	45	October,1989(E)	
13. Cypermethrin	Cymbush	10% EC**	45	October,1988	
14. Fenvalerate	Sumicidin	3% ULV*	75	November,1984	ABW,SBW,Aphids,Jassids,Lygus,(Dysdercus),Calidea
15. Fenvalerate	Sumicidin	20% EC**	75		
16. Flucythrinate	Cybolt	1.7% ULV*	42.5	October,1988	PBW,ABW,Aphids,Lygus,Jassids,Calidea,Dysdercus
17. Flucyhtrinate	Cybolt	10 EC**	42.5	October,1988	
18. Lambda-cyhalothrin A	Karate	0.6% ULV*	15	October,1987	ABW,PBW
19. Lambda-cyhalothrin A	Karate	5% EC**	20	October,1988	Aphids,Jassids,Lygus, Dysdercus,
20. Lambda-cyhalothrin A	Karate	2% ED	7	October,1989	
21. Esfenvalerate	Sumi-Alpha	0.5% ULV***	12.5	October,1988	ABW,SBW,Aphids, ,Jassids,Lygus
22. Esfenvalerate	Sumi-Alpha	2.5% EC **	20	October,1988	
23. Alpha-cypermethrin	Fastac	0.8% ULV ***	20	October,1989	ABW,,Aphids, ,Jassids,Lygus,Calidea,Stainers
24. Deltamethrin	Decis	0.3% ULV **	7.5	October,1989	ABW,SBW,PBW,Whiteflies,Stainers,Aphids,Lygus
25. Deltamethrin	Decis	0.5% ULV *	12.5	October,1981	
26. Deltamethrin	Decis	2.5% EC **	7.5	October,1983	
27. Fluvalinate	Movrik	2% EC **	100	October,1989	ABW,SBW,Aphids,Jassids
28. Fluvalinate	Sandoz	2% EC **	100	October,1989	
29. Biphenthrin	Talstar	2% ULV ***	50	October,1991	ABW,SBW,Aphids,Calidea,Lygus

30. Betacyfluthrin	Bulldog	0.5% ULV ***	12.5	October,1991	ABW,Aphids,Jassids,Lygus,Calidea
31. Cypermethrin + Profenophos	Fenom C	1% + 16% ULV ***	25 + 400	October,1991	ABW,(SBW),Aphids,Jassids,Calidea,Lygus,(Red spidermites)
32. Deltamethrin + Dimethoate	Decis D	0.3% + 12% ULV ***	7.5 + 300	October,1991	ABW,(SBW),Aphids,,Lygus,Jassids,Calidea,Dysdercus
33. Flucythrinate	Cybolt	1.33% ME ULV***	33.25	October,1991	ABW,(SBW),Jassids,Aphids,Lygus,(Calidea),(Dysdercus)
34. Alpha-cypermethrin	Fastac	0.7% ULV ***	17.5	March,1995	ABW,Aphids,Jassids,Lygus,Calidea,Stainers
35. Alpha-cypermethrin + Dimethoate	Fastac + Dimethoate	0.65%/18% ULV ***	16.25 /450	March,1995	ABW,Aphids,Jassids,Lygus,Calidea,Stainers,RSM
36. Deltamethrin	Decis	0.3% ULV ***	7.5	March,1995	ABW,Aphids,Jassids,Lygus,Calidea,Stainers,RSM
37. Cypermethrin	Cycotrin	1.8% ULV ***	45	March,1995	
38. Betacyfluthrin + Dimethoate	Bulldog-F	0.3%+10% ULV ***	7.5	March,1995	
39. Betacyfluthrin	Bulldog	2.5**	12.5 /15	2000	ABW,Jassids,Lygus,Calidea,Stainers
Cypercal D		15/120 UL			

LEGEND

1. **When a pest is enclosed in bracket, it denote that according to manufacture the pest is controlled by the formulation, but there is at present no enough research data from the WCGA & ECGA to support this**
2. **The formulation which are all ULVs are to be applied at a rate of 2.5 litres per hectare**

3. **The formulations which are all ECs are to be applied at a rate of 120 litres (Chemical +water) solution per Hectare**
4. *** Recommended for Eastern and Western Cotton growing Areas**
5. **** Recommended for Eastern Cotton growing Areas only**
6. ***** Recommended for Western Cotton Growing Areas only**
7. **ABW = American bollworm**
8. **SBW = Spine bollworm**
9. **RSM = Red spider mite**

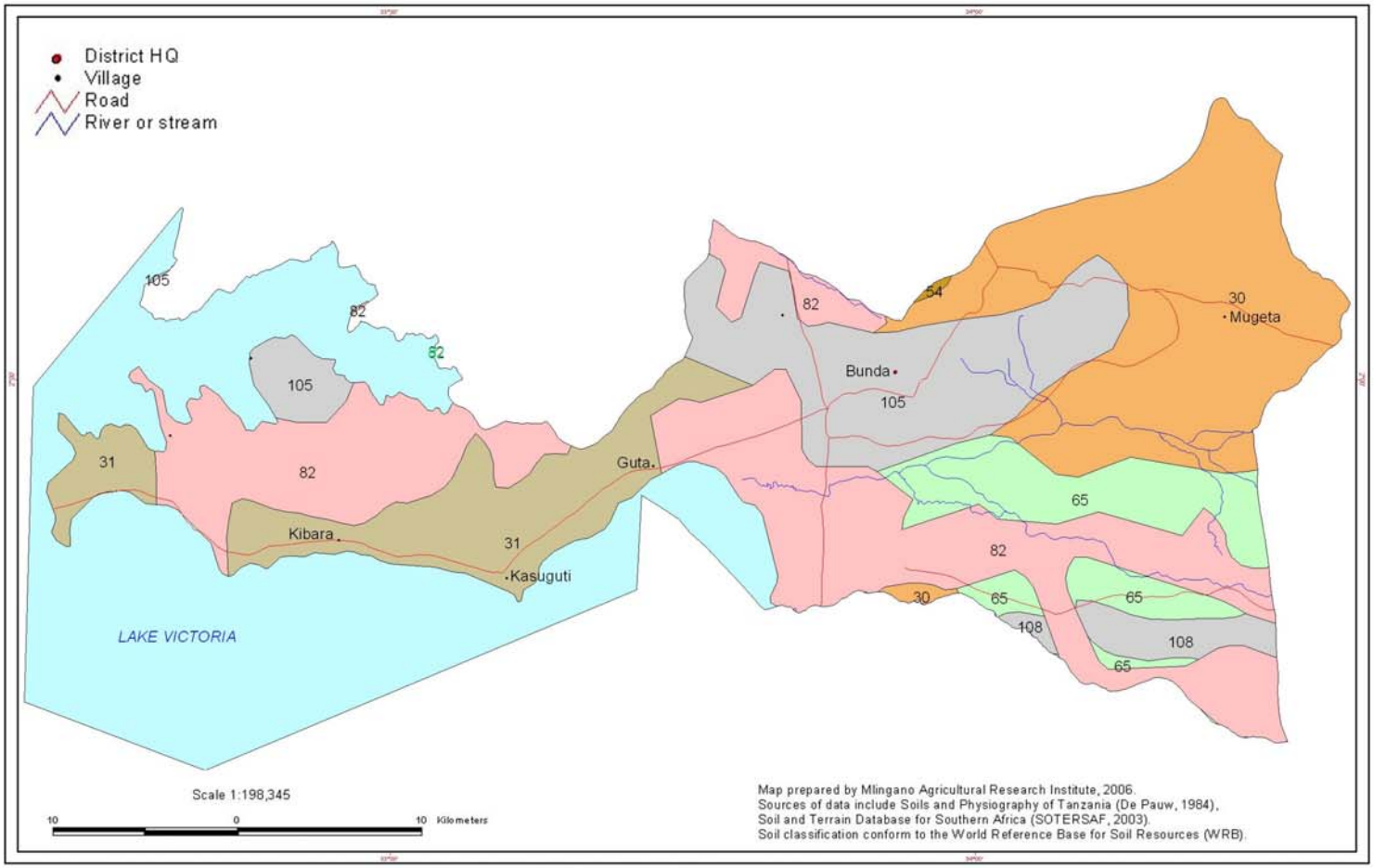
APPENDIX B

2 MAPS OF SOIL TYPES

BUNDA DISTRICT IN THE WCGA

KILOSA DISTRICT IN THE ECGA

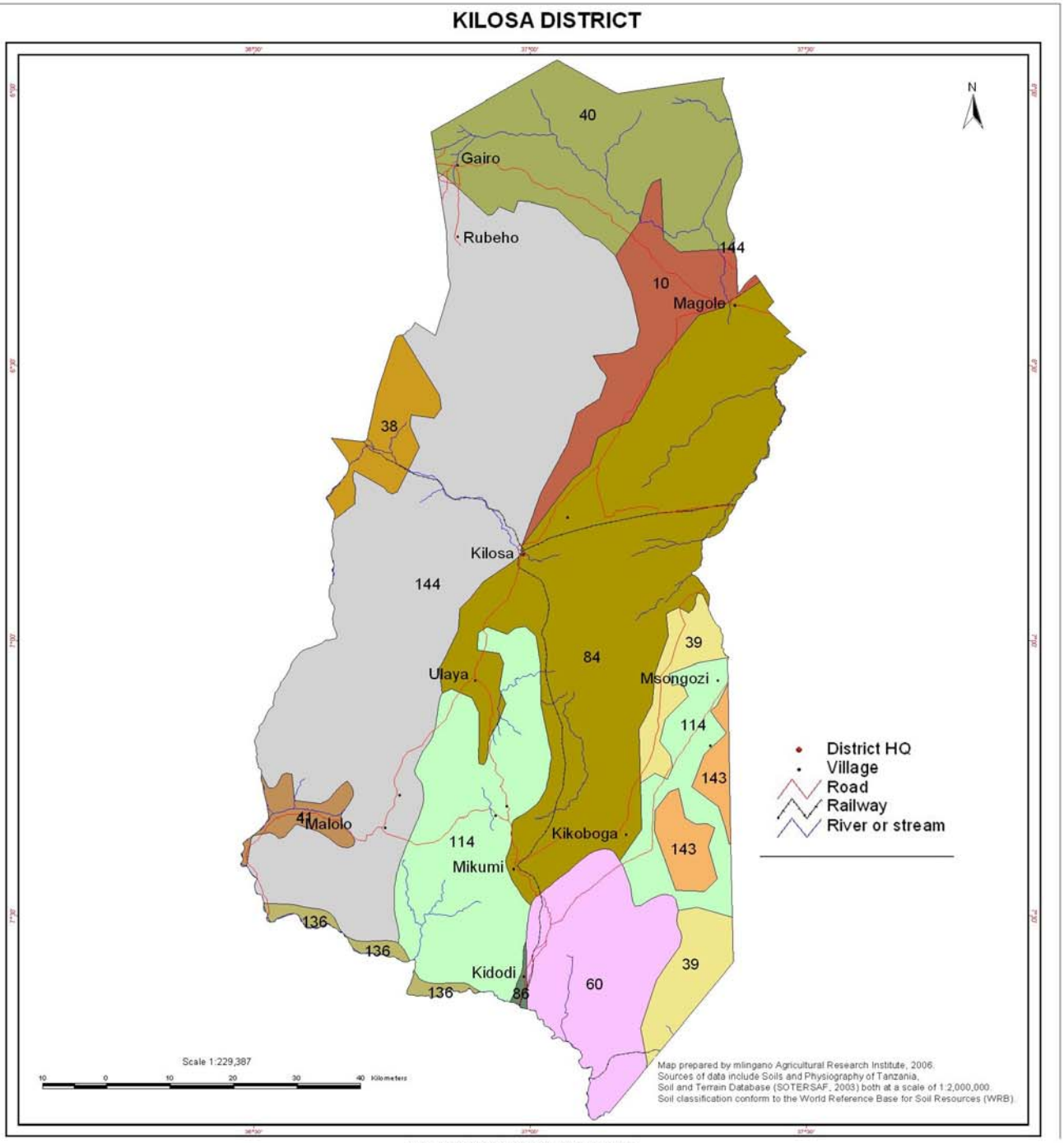
BUNDA DISTRICT



(SOIL AND TERRAIN SOTER) MAPPING UNITS

Symbol	Landform	Lithology	WRB soil subunit	Limitations	Use and management	Extent (ha)	Proportion (%)
105	SH	IA1	Eutri-Rhodic Cambisols	Vary with climate, topography, depth or stoniness	A wide variety of agricultural uses with maintenance of soil organic matter and nutrient levels	69204.3900	2.5727
108	SH	IA1	Eutric Leptosols	Shallowness, stoniness, rockiness	Low volume grazing, forestry	20953.7200	0.7790
147	wat	wat	Waterbody			3457273.4900	0.0000
30	LP	IA1	Calci-Hyposodic Planosols	Strong sodicity and salinity, very low fertility	Suitable for extensive grazing and in some places wetland rice	1504324.8400	55.9238
31	LP	IA1	Chromi-Ferralic Cambisols	Low natural fertility	A wide variety of agricultural uses with maintenance of soil organic matter and nutrient levels	57517.2300	2.1382
54	LP	MB	Rhodic Ferralsols	Low natural fertility and tendency to fix phosphates	Suitable for a wide range of crops, maintenance of soil organic matter, periodic liming	24452.8600	0.9090
65	LP	UC	Mollic Solonetz	Strong sodicity	Extensive grazing, soda mining	541241.4400	20.1209
82	LP	UF1	Eutri-Pellic Vertisols	Difficult workability, difficult water management	High natural fertility suitable for a wide range of crops, small-scale and large-scale irrigated cropping	472257.7900	17.5564

KILOSA DISTRICT



SOIL AND TERRAIN (SOTER) MAPPING UNITS

Symbol	Landform	Lithology	WRB soil subunit	Limitation	Use and management	Extent (ha)	Proportion (%)
10	LF	MA	Haplic Phaeozems	Periodic drought, wind and water erosion	High potential for agriculture, improved pastures and forestry	73388.1200	0.6300
114	SH	MA2	Rhodic Acrisols	Low natural fertility, aluminium toxicity, strong phosphate fixation, slaking/crusting	Adapted cropping systems with complete fertilisation and preservation of the surface soil	260315.8400	2.2500
136	TE	MA2	Eutric Leptosols	Shallowness, stoniness, rockiness	Low volume grazing, forestry	179057.1900	1.5300
143	TM	MA	Humi-Umbric Acrisols	Low natural fertility, aluminium toxicity, strong phosphate fixation	Adapted cropping systems with complete fertilisation and preservation of the surface soil	202002.2900	1.7400
144	TM	MA2	Humi-Umbric Acrisols	Low natural fertility, aluminium toxicity, strong phosphate fixation	Adapted cropping systems with complete fertilisation and preservation of the surface soil	677273.7700	5.8300
38	LP	MA	Humi-Rhodic Luvisols	Vary with climate, topography, depth or stoniness	Potentially suitable for a wide range of agricultural use	248623.8200	2.1400
39	LP	MA2	Rhodic Ferralsols	Low natural fertility and tendency to fix phosphates	Suitable for a wide range of crops, maintenance of soil organic matter, periodic liming	776921.8000	6.6800
40	LP	MA2	Humi-Rhodic Luvisols	Vary with climate, topography, depth or stoniness	Potentially suitable for a wide range of agricultural use	4971247.8000	42.7800
41	LP	MA2	Ferralic Cambisols	Low natural fertility	A wide variety of agricultural uses with maintenance of soil organic matter and nutrient levels	220404.6400	1.9000
60	LP	SC2	Chromi-Ferralic Cambisols	Low natural fertility	A wide variety of agricultural uses with maintenance of soil organic matter and nutrient levels	3131914.9600	26.9500
84	LP	UF2	Humi-Gleyic Fluvisols	Susceptible to seasonal flooding, high groundwater levels and salinity	High natural fertility suitable for rainfed and irrigated agriculture with adequate drainage	585973.9400	5.0400
86	LP	UF2	Eutri-Gleyic Fluvisols	Susceptible to seasonal flooding, high groundwater levels and salinity	High natural fertility suitable for rainfed and irrigated agriculture with adequate drainage	293658.2100	2.5300

APPENDIX C

NOTES FROM WCGA STAKEHOLDER WORKSHOP HELD AT MWANZA, 30 APRIL 2007

TANZANIA COTTON & TEXTILE STUDY – LAKE ZONE
REGISTER OF PARTICIPANTS TO THE WORKSHOP

.....

s/n	Name	Organization	Position	Postal Address	E-mail Address	Telephone Number	Signature
1	AIDAN MWAITEGE	OLAM GTZ LTD	I/MANAGER	BOX 1995 MZA	rmaidan @yahoo.com	0754392711	
2	DICKENS K. SHINDIKA	COTTON AGENCY AND GINNING CO. LTD.	DIRECTOR	BOX 110055 DAR-ES-SALAAM	Sdickens@intafrica.com	0773B5100 0713 438544	
3	BENEDICT MASELLE	TANZANIA COTTON ASSOC.	EXECUTIVE SECRETARY	P.O. BOX 1692 MWANZA	tca@tca.co.tz	+255 28 2500203 +255 784 520004	
4	DONALD MAX	COPCOT COTTON TRADING (T) LTD	GENERAL MANAGER	P.O.BOX 220 GEITA MWANZA	donald @ copcotgettz.com	028-2520127 0784 799902	
5	LAZARO NKUTA	TANZANIA COTTON GROWERS ASSOCIATION	CHAIRMAN	P.O.BOX 979 MWANZA	zacaga @ yahoo.com	0754-439811	
6	MOSES	AFRISIAN GINNING LTD.	GENERAL MANAGER	P.O.BOX 475 SHINYANGA	agl shy @ iway africa.com	0282763 751.	

...ZANIA COTTON & TEXTILE STUDY – LAKE ZONE
REGISTER OF PARTICIPANTS TO THE WORKSHOP

.....

s/n	Name	Organization	Position	Postal Address	E-mail Address	Telephone Number	Signature
7	Jones Bwahama	Tanzania Cotton Board	Zonal Director	Box 61 Mwanza		0784-500243	
8	Ahmed A. Ameir	Aham Investment (Cotton Division)	Director	Box 281 Shinyanga		0754324222.	
9	Absalim Salim Mbwambo	Jambo Oil Mill & Ginneries (o.A	General Manager	Box 71 Shinyanga	absmbwambo@yahoo.com	0784748208	
10	William M. Kasubi	Tanzania Cotton Growers Association (Tacoga	General Secretary	P.O. Box 1166 Mwanza	wmkasubi@yahoo.com	0754-614646	
11	Prem Kapoor	TCA V. Chairman	V. Chairman	Box 16 Mza	liktex@liktexmza.com	0754361758	
12							

Notes from WCGA Stakeholder Workshop held at Mwanza, 30 April 2007.

Attendance list

Constraints to cotton sector:

- Poor quality of seeds because of mixing (Mr Jones Bwahama of TCB challenged this comment by saying that there should no longer be a problem with mixing of seeds. UK91 is widely available). The mixing may be as a result of a few farmers having kept seed used in previous seasons, which could be older types, and used this to fill in gaps in the field. Seed supply in the different regions is not consistent. Some get pure UK91, others get mixed seeds.
- Demand/supply gaps for seed and insecticides.
- About 30 % of seed cotton purchases bypass the passbook system and therefore there is under reporting of demand of seed and inputs for the following season. Because some farmers do not have passbooks they lack a credit record for buying seed and insecticides for the next season. This could lead to seed mixing where farmers use any seed they can obtain.
- Lack of information from research on the climatic needs of the various varieties of cotton
- Low funding of research by Government. Research relies heavily on the Cotton Development Fund to pay for their operational costs. This funding is inadequate.
- Very low adoption of out grower contracts between ginners and farmers.
- Education of the farmers in good crop husbandry – low number of extension officers and little publishing of production information by the Ministry of Agriculture due to lack of funds.
- Cultural and socio economic constraints
- Outdated farming technology being used
- Ginning:
    - Lack of trained personnel – Tanzania should establish an institute for training ginnery technicians
    - Very old machinery in ginneries
    - Difficulty in obtaining spare parts for repairing ginnery equipment. Possibly the Government could consider import tax benefits for importing machinery spares.
    - Ginneries should focus on their core business of ginning and not get involved as bankers, policy issues etc. (NOTE: They could underwrite loans on behalf of groups of farmers).
- Transport problems – rural roads are in poor condition.

- Unfair treatment of farmers since liberalisation. Subjected to low prices by unscrupulous buyers.
- Lack of information to farmers on price prospects for the coming seasons crop (**market intelligence**). Having an indication of likely prices in advance would help farmers to decide whether planting cotton is financially viable.
- Farmers have poor access to credit.
- Small-scale farmers must be protected with subsidies or have access to affordable inputs (input prices subsidised through the Cotton Development Fund).

Challenges:

Who will be responsible to produce 5000 – 6000 tons of acid-delinted seed for the cotton industry? The cotton industry should modernise as has been done in the maize industry, which has developed a culture of farmers buying their seed.

Because of demand by oil millers for seed the industry will only reserve the amount specified by law. Ginneries and oil mills go hand in hand.

Financial service providers should be closer to the farmers or ginners for facilitation of services.

Credit system currently in place:

Ministry stakeholders prepare a budget based on the estimated seed cotton yield for the country. Passbooks reflect seed cotton sales by farmers. The credits in the passbook are used to buy inputs for the next season. Seeds are available at the buying posts and purchased against credits reflected in the passbook.

APPENDIX D

ATTENDANCE REGISTER AND NOTES FROM ECGA STAKEHOLDER WORKSHOP HELD AT MOROGORO, 17 MAY 2007

TANZANIA COTTON & TEXTILE STUDY – MOROGORO REGION
REGISTER OF PARTICIPANTS TO THE WORKSHOP

17 MAY 2007

s/n	Name	Organization	Position	Postal Address	E-mail Address	Telephone Number	Signature
1	FURAHA P. MROSSO	ARI - ILONGA	Head Cotton research Eastern zone	P.O. BOX 33 KILOSA	furahamrosso@yahoo.com	0784 739 181	
2	KUSANYA FREDERICK SHINDIKA	SHINDIKA GROUP SCOTT ENT. LTD	COO	P.O. Box 2043 MOROGORO	scott@shindikagroup.co.tz	0755-774400	
3	MNL. ANTHONY A. ALFAN CHALAMILA	MOGACU LTD	Com	P.O. BOX 310 MOROGORO	P.O. Box 310, MOROGORO	0713-24236	
4	GEOFFREY T. MBAGA	TCCIA MOROGORO REGION	REGIONAL CHAIRMAN	P.O. Box 1538 MOROGORO	delcotz@hotmail.com 0754773646		
5	HAJI A. MPANDA	MAHENGE/ ULANGA		Box 22 MAHENGE/ ULANGA	-	0787-0685 74	
6	MOHAMED M. KUMBEMBE	MAHENGE/ ULANGA	MKULIMA/ D UJANI	BOX 22 MAHENGE/ ULANGA	-	0787-804597	

TANZANIA COTTON & TEXTILE STUDY – MOROGORO REGION
REGISTER OF PARTICIPANTS TO THE WORKSHOP

17 MAY 2007

s/n	Name	Organization	Position	Postal Address	E-mail Address	Telephone Number	Signature
7	HAULE, GERHARD	RAS MOROGORO	TECHNICAL ADVISOR TRADE	BOX 650 MOROGORO	gerhaul @yahoo.com	0784-689911	Haule
8	MASANGYA E.	DED MOROGORO	AGRICULTURE EXTENSION OFFICER	BOX 1850		0754-026770	Masangya
9	AHAMAD MAHUNDUMULA		FARMER	BOX 1604 MOR-	–	–	
10	JOSEPH MKELEMI		FARMER	BOX 1604 MOR-	–	–	JOSEPH
11	CLEMENTINA J. ASSENGA		AGRICULTURE EXTENSION OFFICER	Box 663 - MVOMERO DISTRICT		0786-888355	
12	WILLIAM JAISEDA		AGRICULTURE EXTENSION OFFICER	BOX 707	–	0786924751 0756489449	

MOROGORO DIST

TANZANIA COTTON & TEXTILE STUDY – MOROGORO REGION
REGISTER OF PARTICIPANTS TO THE WORKSHOP

17 MAY 2007

s/n	Name	Organization	Position	Postal Address	E-mail Address	Telephone Number	Signature
13	Edith Shayo	Reginal Secretariat Morogoro	Assistant Administrative Secretary	BOX 650 MOROGORO	edishayo@yahoo.com	023-2601308 0754380320	
14	Anne Nyahamba	District Agric. Office	Agric. Officer.	Box 650 Morogoro	anne42@yahoo.com	0784-623164	
15	Rosemary Chuya	RADIO UKWELI	Mwandishi & mtangazaji	BOX 1171 morogoro	rosemarychuya@yahoo.com	0756860948	
16	MARINA ROBERT	HABARI CORP	JOURNALIST	BOX 1462 MOROGORO	marinababb@yahoo.com	0756-925980	
17	James Ndonga	HOLDEN GLTD MSOWERA KILOSA	OPERATIONS OFFICER	BOX 2266 KILOSA		0784947700	
18							

Notes from ECGA Stakeholder Workshop held at Morogoro, 17 May 2007.

Attendance list

Constraints to cotton sector:

- Poor farming methods
- Lack of inputs
- Lack of markets, for example farmers who grew cotton in Mwaya, Ulanga District had nowhere to sell their crop. Eventually it was purchased at a very low price and they battled to receive payment.
- Inputs
    - Quantity
    - Quality – some pesticides were ineffective
    - Late delivery, in Mwomero
- Lack of "ownership" of the cotton sector after liberalisation. The demise of the cotton cooperatives has contributed to the constraints in production and marketing.
- Cotton production is less profitable than other crops.
- Costs of production are Tsh 100000/acre in 2006/07 and return is Tsh 40 000, on seed cotton yield of 300 kg/acre. This cost of production is $ 60. Market prices; low of Tsh 150, average of Tsh 250, high of Tsh 340. A target yield of 500 kg/acre gives a gross income of $125 at the high price, and Gross Margin of $ 65
- Liberalisation has increased risk to the farmer
    - No markets
    - Volatile prices for seed cotton
    - Mechanisation services most often too late for high yields
- The constraints can be divided into two classes; temporary and permanent:
    - Temporary problems are of a historical nature, following liberalisation where the cotton industry has shifted from Government owned cooperatives to private ownership. The changes have been at the cost of the farmer, where the farmer has little protection from low prices set by the buyers.
    - Permanent problems: The competition between cotton and food crops. Also there is a need for contracts/partnerships between investors and small holder farmers.
        - Assurance of markets

- Infrastructure upgrading
- Shortage of labour
- Protection from price fluctuations where low prices are received for seed cotton
- World market prices receive- developing local markets for value-adding may help to improve the return to farmers and textile industry.

Challenge: There is a need to educate our leaders to understand that if a company invests in out growers it is a total commitment and the risks are great, and the government needs to support the out grower programmes.

Possible sites for demonstrations:

1) Ulanga
2) Mvomero/Makuyu or Msowero/Kilosa because of proximity to the research centre

Criteria:

- Link to independent player (Private sector)
- Farmer Field School programme of Ministry of Agriculture
- Cotton research stations
- Specialists in the new technologies.

APPENDIX E

EXTENSION OFFICERS IN THE MWANZA REGION (2007)

AGRICULTURE AND LIVESTOCK WORKERS (EXTENSION OFFICERS) – Mwanza Region

District	Extension officers at District HQ	Extension officers at Villages	Total	Transport facilities			Number of Villages	Population (2002)	Number of households
				Vehicle	Motorcycle	Bicycles			
Geita	17	42	59	1 defective	3	-	172	712,195	115,640
Magu	14	48	60	1 running	-	9	116	416,113	70,065
Mwanza City Council	20	33	53	1 running	6	10	8	476,646	102,487
Ukerewe	10	24	34	1 running	1	-	74	261,944	40,729
Kwimba	10	17	27	1 defective	2	-	111	316,180	49,891
Sengerema	15	58	73	1 running	1	-	121	501,915	76,632
Missungwi	14	45	59	1 running	8	-	78	257,155	39,956

ANNEX B

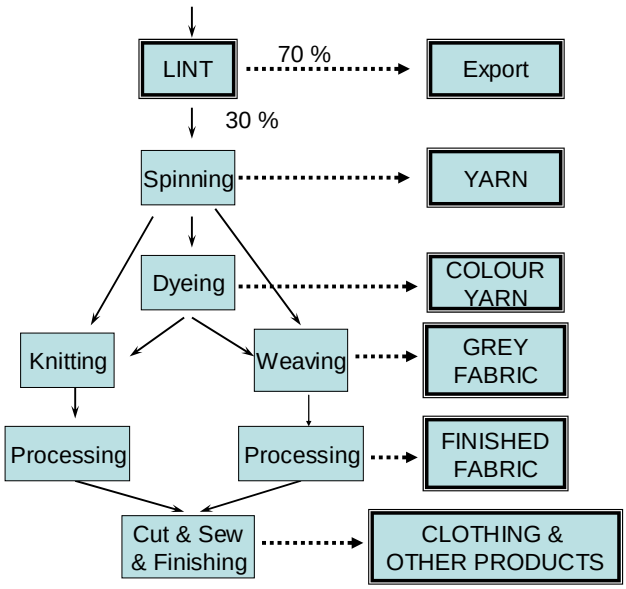
Analysis of the textile manufacturing sector and its potential

Table of contents

B.1. Background

The conversion of cotton lint into consumer products is a very long and labour intensive process. Several key stages are required to convert lint cotton into clothing and other consumer products (figure B.1). Each of these stages produces an intermediate product which is used as raw material for the subsequent stages. These intermediate products can often be bought or sold on the international market as commodities. Currently, over 70% of Tanzanian cotton production is exported as lint, with minimum added value. To maximise the value of the cotton lint and to increase employment in Tanzania, expansion of the textile /clothing industry is essential.

Figure B.1 The Textile Manufacturing Processes



This report is based on a survey covering about 50% of all the operating textile companies in Tanzania and includes information from interviews with some key stakeholders.

B.2. Identified Issues

B.2.1. Spinning

For spinning, the quality of lint cotton emerging from the supply chain is very important as this impacts on the yarn quality. In order to identify the appropriate technologies and investments needed to increase the production capacity to absorb 90% of lint cotton produced in 2015 (target of 270,000 tonnes), the current installed capacity, operating capacity, the technology employed, the availability of spare parts, as well as the managerial and technical skills of senior staff and operatives need to be established.

B.2.2. Weaving

Several aspects of the weaving operations are below the standard required if Tanzania is to meet the 2015 target of 244,000 tonnes of cotton fibre being processed within the country annually. The old shuttle-loom technology which is dominant throughout the country needs to be supplemented or replaced by wider and faster looms based on more modern technology. Such equipment can weave wide bed sheets, or may alternatively be used to manufacture multiple fabrics simultaneously side-by-side across the loom.

Such a change needs to be accompanied by a transformation in the attitude of the workforce. In order to create high-quality fabric from the excellent raw cotton fibre grown in Tanzania, the setting-up, maintenance and running of the looms must be commensurate with the high-precision, high-performance equipment that weaving machinery is. The machines must be correctly set up, and regular checking and maintenance is essential. To this end specialist engineers and trainers need to be available within the mills and the workforces need appropriate training and retraining as necessary.

The spun cotton yarns that are available for weaving in Tanzania are generally of low grade despite the fact that long-fibre cotton is grown and the seed cotton is good quality. Hence, attention needs to be paid to upgrading the spinning operations. Warp preparation also needs to be upgraded; if more modern types of size were used (e.g. PVA formulations), the amount of fly produced during weaving would be lower and there would be fewer warp breaks, leading to higher weaving efficiencies. If the move is made to shuttleless looms, the use of modern sizing solutions will be unavoidable.

B.2.3. Processing

The main issues identified in the processing stage include low skill level of the labour force and low attention to quality. Provision for processing polyester/cotton blends as well as 100% cotton needs to be made as the international market will demand this option. Careful selection of operatives and rigorous training is essential to meet the demands of a modern, efficient quality-driven facility. It is also noted that the information collected during the visits to the various factories is taken at face value and cannot be verified.

B.2.4. Clothing

The garment-manufacturing stage, the final phase of the fibre development chain, does not necessarily have to start with fabric from any particular mill and indeed this is not usually the case. The low quality of the finished fabrics currently available from most of the weaving facilities in Tanzania, completely precludes their use in cut and sew garment manufacture. Only the local market appears to be prepared to accept such poor quality fabrics, but at a very low price, further depressed by the massive second hand clothes market.

The second-hand clothes market appears to be rampant across the whole of Tanzania and seriously affects the entire domestic clothing market. This also feeds the local preference for items manufactured from synthetic fibres and blends. The small profit margin available on clothing sales within Tanzania renders untenable the introduction of medium or large-scale good quality garment production for the local market, particularly as suitable fabric would have to be imported into the country and would therefore be liable to duty.

Internally-manufactured woven fabric costs approximately $4.00 per metre, whereas imported twill is $1.25 and imported denim is $1.65. The output from those companies producing knitted fabric is all consumed within each respective business. Hence, until good-quality, affordable woven and knitted fabrics become available from within Tanzania, the USA offers the only significant export route for apparel, under the AGOA agreement.

B.3. The Scale of the Industry

B.3.1. Overview of the Tanzania Textile Industry

There are reported to be around 20 textile companies in Tanzania, although a number of these have common ownership. Most of the companies were initially set up by the public sector in the 1960s or 1970s. With the exception of two, all of these companies stopped production during the 1990s for various reasons. Most were privatised in the last few years and have resumed production.

Almost all of the companies were set up as fully integrated enterprises, with the capability of processing lint cotton into a final product. The fully integrated approach would have been an obvious solution to start an industry where the infrastructure was poor, but it is a very rigid structure and uncommon in other major textile manufacturing countries where there is usually a mixture of stand-alone companies which provide only one or two processes within the textile chain (such as spinning) and some very large fully-integrated enterprises. In many circumstances, the major processes such as spinning, weaving, knitting, clothing and dyeing/finishing are often considered as separate sectors of the textile industry. In addition to lint cotton and clothing, yarns and grey/finished fabrics are widely available on the international market.

The general technical level of the industry is very out of date with most of the equipment being 30 or more years old. This seriously restricts the production level and quality of the products. The efficiency of the industry is generally low by international standards. The main factors for this are the old machinery, low labour efficiency, lack of skilled workforce, and poor infrastructure.

The management of the industry is mostly from overseas with good knowledge of the industry both technically and market-wise. However, due to a combination of factors, the upgrading of the industry is very slow. The low quality demand of the domestic market, poor infrastructure and the lack of an efficient and skilled workforce are some of the main factors deterring investment.

B.3.2. Spinning

Spinning is the first stage of the long chain of textile processes required to convert cotton lint into consumer products. All of the spinning capacity in Tanzania is ring spinning. The current installed capacity is estimated to be around 250,000 spindles. At current production efficiency and yarn count, the total installed spindles can process 22,500 tonnes of lint cotton when fully utilised.

B3.3. Weaving

All the inspected plants were running weaving operations with between 800 and 900 shuttle-based looms. Two weaving plants were equipped with shuttle looms which were

only a couple of years old, having been recently purchased from China. These machines were in good condition, but were only able to weave relatively narrow (38") fabrics at low speeds around 160 to 175 picks per minute. The fabric was, nonetheless, of good quality. Such plants declared their output to be in the region of 40,000 metres of 45 Nm plain woven cotton fabric per day with a warp density of 26 ends per cm and a weft density of 22 picks per cm.

One plant had a number (48) of shuttleless, gripper-type (Sulzer TW11) projectile looms housed separately from the main weaving facility. Although they dated from the early 1970s, they were 130 inches wide and were weaving 240 picks per minute; considerably faster than the shuttle looms. They were being used to manufacture three fabrics simultaneously (side-by-side) on each machine. Such equipment is capable of much higher weft insertion rates than the slower and narrower shuttle looms. Some relatively new machines were running more slowly than this speed, possibly because the yarn quality was mediocre, the warp sizing was poor and the machine adjustments were imperfect.

B.3.4. Processing

The majority of the processing is based around locally consumed imitation wax products, Khanga and Kitenge styles, which are cotton-based products. The general standard of these products is poor by European standards, but perfectly acceptable for the local market. The estimated internal requirement is around 300 million metres per year. This figure was corroborated by several sources and is based on there being ten million females who each would buy 10 Khanga/ Kitenge lengths each year. The local installed capacity can offer between 200 million and 240 million metres of these products. At least 100 million of this output is produced using imported grey fabric from India. The responsible persons spoken to seemed reluctant to consider replacing the imported fabric with locally-made material, even if the capacity were to be available. One factory is exporting 4,500,000 leisure wear garments per year to the UK and USA, showing that the industry in Tanzania has the capability to produce high-quality goods suitable for the export market. Quite clearly the knitted leisurewear and underwear sectors need to be exploited to the full. Some companies have a very strong market position in the manufacture of Mosquito net fabric based on polyester yarn. This is an expanding area. For other products, maintaining an acceptable standard for export is seen as a serious challenge.

B.3.5. Clothing

The final value-added link in the textile manufacturing chain is that of clothing production. There are invariably small tailoring outlets in each Tanzanian town where khanga and kitenge fabrics can be made up into garments and where second hand clothes may be altered to fit. However, each unit nominally contains a single treadle-driven lockstitch sewing machine or occasionally two. The machinists have no concept of production-line working or factory organisation and are only capable of low-speed working.

Oxfam figures for 2003 place the total value of the world second-hand clothing market at around US 1.0 billion. Of the Tanzanian clothing market, 65% by value is the preserve of the second-hand clothing trade. This figure places the volume of second hand clothing imports at well over 90% of the total Tanzanian clothing market. T-shirts are available for a ticket price as low as TSh 99 ($0.076).

It appears that only three or four large-scale cut-and-sew operations are currently in operation in the country and the economics of the situation dictate that no commercial clothing manufacture is directed at domestic consumption. Only uniforms and promotional garments with printed or embroidered logos are produced for the home market. A typical casual-wear operation uses 335 machinists to manufacture 9,000 t-shirts in an eight-hour shift.

B.4. The Characteristics of the Industry

B.4.1. Spinning

Almost all of the spinning factories are cotton-based, with only one exception, where some cotton/polyester blends are produced. The technology in this sector is generally over 30 years old. The running speed is about 50% of what can be achieved with modern ring spinning technology. The current operating capacity is below 50% with an annual production of around 10,000 tonnes due to the outdated technology, lack of spare parts, low labour efficiency and, in some cases, low demand within the fully-integrated operations.

With the exception of one, all of the spinning factories are within fully-integrated companies and the cotton yarns are used completely within the same company for fabric production.

B.4.2. Weaving

The majority of the production machinery currently in use is based on old shuttle-loom technology producing 100% plain-weave cotton fabric. Such equipment (even if it is very old) is perfectly capable of producing high quality material, providing that it is correctly adjusted and well maintained. Unfortunately, much of the plant has not been well maintained, the automatic weft-replenishment systems were not functioning and the weft packages had to be changed by hand. Furthermore, the looms were producing low grade fabric, the manufacturing problems being exacerbated by the fact that the spun yarn is of poor quality, which inevitably means that the looms have to be run slowly and suffer from an increased level of stoppages due to yarn breakage.

Older Picanol shuttle looms, despite their high quality, have to be taken out of service due to the fact that the weaving technicians were unable to repair them owing to a lack of spare parts for the weft replenishment system. Indeed, large numbers of Picanol looms were being dismantled to provide spare parts for those machines still in service.

B.4.3. Processing

The factories as seen are using old equipment which is poorly maintained and inefficient, and totally unsuitable to compete in the global market. In many cases, the operating width of the equipment is below the minimum requirement for garment production. No continuous dyeing facility was seen and there is no processing capability for an export bed sheet market. The factories were operating to their maximum capabilities with poor efficiencies, no great attention paid to printing quality, weft straightness, colour fastness or fabric quality. All printing companies were using reactive dyes and virtually all fabric was mercerised; no caustic recovery was seen. The companies ran with a limited colour palette, and shade reproducibility was not paramount. All colour and chemicals were

imported from India or China and there was no independent verification of standardisation or quality of these products. Effluent was generally sent to a treatment plant (one or two firms do discharge directly into a river) although the treatment of the effluent was questionable; discharges were highly coloured with high pH even after neutralising, and all discharges were to rivers. In most factories the working environment was very poor, with high ambient temperatures, poor lighting, poor operating practices, dirty work spaces and general congestion. With one or two exceptions, the product quality was very poor and totally unsuitable for the export market. It was noted that the processing plants usually had a large number of people involved on the shop floor, many of whom seemed to have no idea of what to do, thus creating inefficiencies. There was no evidence of operator training in some factories. All managements highlighted expensive energy costs but no evidence of energy-saving measures was seen. All the managements spoken to were reluctant to give information on operating costs, other than energy and labour, so it is not possible to compare with current market expectation.

B.4.4. Clothing

All the large-scale garment making plants offer good working conditions and are populated with a wide range of modern machinery; this includes back tackers, button holers, button sewing machines as well as the BSST 301 lockstitch machines, BSST 504 over-lockers and BSST 101 chain stitching equipment which make up the bulk of the sewing machinery. The machinery is generally of very recent Chinese and Japanese origin, as are the multi-head embroidery machines. Similarly modern lockstitch machinery is in use in weaving firms which are seaming finished goods such as bed sheets.

The established factories which make up fabric knitted within their firm are working close to capacity. In contrast, a recently-created EPZ enterprise which imports woven blended fabric to be cut-and-sewn into formal garments for export has barely 30% productive machinists out of a workforce of 150, most of whom are in training. Another 150 brand new sewing machines are mothballed until more operators can be trained. The company is well equipped with stone-wash, enzyme-wash and acid-wash machinery as well as a micro-sanding facility.

B.5. Obstacles to Expansion

B.5.1. Spinning

The machinery is out of date and spare parts and servicing are major problems in the spinning factories. In addition, the condition of many of the factories is sub-standard with inadequate cleaning, lack of air conditioning, and poor buildings.

There is a shortage of skilled and efficient workers and there is no local textile education facility.

The infrastructure is very poor. This includes power and water supply, and transport.

Due to a combination of the above factors, the productivity and utilisation of equipment is low.

The current supply of cotton is unreliable, both in terms of quality and quantity. The quality of the yarns produced is mostly far below international standards. This is due to poor

maintenance of machinery and poor factory conditions. In addition, due to the lack of proper blow-room equipment and fibre management, the quality of the yarns is not consistent. The poor yarn quality is acceptable for products aimed at the domestic market, but it is wholly unacceptable on the international yarn market.

The lint cotton quality at present is generally good for most textile products. However, there are issues related to cotton maturity. For high-grade consumer products on the international market, the maturity required is usually above 90% while a significant proportion of the cotton currently produced in Tanzania tends to be below 90%. Related to this, there is a lack of incentives for cotton farmers to produce good quality cotton consistently.

The fully integrated structure is very rigid, especially as most of these integrated companies are catering for the domestic market which provides little incentive to increase quality.

Modern spinning technology is very capital intensive.

B.5.2. Weaving

The looms are outdated, hence spare parts and servicing are major problems in the weaving factories. Modern weaving technology is very capital intensive, yet serious investment is essential if the quality of the woven cotton is to be raised to international levels.

Despite the good quality of the seed cotton, the spun cotton yarn is very poor and needs to be improved. Warp preparation also needs to be upgraded to improve weaving efficiencies.

In addition, the condition of many of the buildings is poor with inadequate cleaning and lack of air conditioning. The infrastructure is also problematical; the power and water supplies fail without notice and transport is slow and unreliable.

There is a shortage of skilled weavers and there is no local textile education facility hence the casual labour is of particularly low quality, with poor attitude.

B.5.3. Processing

Current competitiveness is questionable due to poor efficiencies at all stages of the manufacturing process. Old processing equipment is unsuitable for the export market. Potential investment requirements are huge. The ownership of most of the existing facilities is Indian; they have a high technical skill level with an aggressive management style, however, some current management seems to lack the ambition to move away from the local consuming market, which is comfortable for them. To change operating systems and to re-educate workforces in existing facilities in order to operate in a more competitive quality-driven market will be extremely difficult. In today's market, green issues are increasingly important and there is a requirement to show prospective customers environmental responsibility, carrying more investment cost. Labour rates are comparable with the Far East although the general comment on the labour quality is that they have a productive capacity of less than 70% of the Far Eastern or Indian equivalent. This would apply more to assembly operatives than process workers. Factory location is a major

factor in servicing an export market, due to the current logistic issues the facilities should be sited as near to the shipping point (seaport or airport) as possible. Any delivery compromise should be with the input feeder services to the finishing plants. The provision of a clean and completely reliable electrical supply is paramount. Energy costs are high for those using oil as the primary energy source.

B.5.3. Clothing

The clothing industry is hampered primarily by the lack of high quality fabric of local manufacture. Sewing machines are relatively inexpensive in terms of capital expenditure, but clothing demands a variety of good quality knitted and woven fabrics. Were such materials available within Tanzania, then the European market would become accessible. Sales into the EU are currently precluded by the rules of origin which effectively require fabric to be sourced in the country in which the clothing is made.

The clothing industry also suffers from a dearth of expert sewing machinists familiar with high throughput manufacture. Hence, virtually all trainers have to be brought in from overseas, yet there is a defined limit (five) to the numbers that each firm may employ. It consequently takes approximately six months before a trainee is ready to join a production line; this is four times the period expected in competing countries, hence the financial investment in the workforce is unexpectedly high. Similarly, clothing firms also need sewing machine engineers to maintain equipment and to set up machines for handling difficult materials. This requirement is also hit by the lack of local expertise and by the limit on the number of overseas employees.

The unbridled second-hand market makes all but the upper-middle part of the local domestic market inaccessible to large-scale clothing manufacturers.

The country's infrastructure is very poor; this includes connection to and continuity of electrical power which is essential for clothing manufacture. There are also problems with transport across the country and delays when shipping into and out of the country. The global clothing trade is founded upon strict delivery times for high quality goods, and fierce penalties are imposed for late delivery.

The above factors, in combination, lead to a situation in which clothing companies face a long and slow start-up period during which there is little or no return on investment.

B.6. Strategies for Expansion

B.6.1. Spinning

Potentially, the cotton lint quality can be very high and there is an increasing demand for natural products in more developed countries. This increases export opportunities for high quality cotton yarns and cotton consumer products.

Due to the outdated machinery and poor condition of many of the factories, it is not viable to upgrade existing machinery for increased production. Instead, investment in modern machinery is the only option if the capacity of the spinning industry is to be increased.

If 90% of the projected lint cotton production of 270,000 tonnes is to be processed within the country, increasing spinning capacity by investing in modern machinery is the only

viable option. For a typical 30 Ne cotton carded yarn with average 10% wastage, about three million spindles are required. If combed yarns are to be produced, the average wastage is about 30%. In this case, 2.3 million spindles are required. The total investment for machinery excluding building and operating capital at current prices is over US$1 billion. However a strategy of buying recent but second hand equipment could reduce this to approximately $500 million (the figure which has been adopted for planning purposes).

As an alternative to ring spinning, rotor spinning usage is increasing internationally. This is a much faster technology with a production per position around seven times that of ring spinning. However, the initial capital investment cost per position is also much higher. The total initial investment cost for a comparable production level is similar to that of ring spinning. The benefit or rotor spinning is that it requires less labour and is a more attractive option when labour costs are high. However, rotor yarn quality is generally lower than ring yarn quality. Given the potential quality of cotton lint in Tanzania, to maximise the value of the fibre, investment in new ring spinning is preferable to investment in rotor spinning.

B.6.2. Weaving

Due to the weaving equipment being so outdated, and also because of the poor condition of many of the factories, it is not viable to upgrade existing machinery for increased production. Instead, investment in modern looms is the only viable option. In order to reach the intended cotton fibre consumption target set for 2015, it is necessary to upgrade the present weaving machinery to high-speed shuttleless looms. As there are 48 Sulzer TW11 machines already in service, it would be prudent to purchase more machines from the same manufacturer.

Shuttleless machines are expensive to buy new (approx £50,000 for a 130 inch wide machine) and there are very high-grade second-hand machines on the market, so this may be the most cost effective approach. Looms are high precision, high performance machines and must be correctly set up; regular checking and maintenance is essential. To this end specialist engineers and trainers need to be available within the mills and the workforces need appropriate training and retraining as necessary.

A centralised training facility could most efficiently provide the required training of weaving technicians across the country. The engineering department of Dar es Salaam University might usefully be able to provide such a facility providing suitable specialisms could be introduced there.

Modern weaving machinery operating under favourable conditions should be capable of weaving efficiencies of 92%. Hence, 1,000 metres of Kanga/Kitenge style fabric at a weaving width of approx 130 inches (two fabrics woven side by side in the loom) would be woven in approx 7.5 days if the machine speed was 450 picks per minute. The amount of yarn consumed for warp and weft would be approx 380 Kg, allowing for a small amount of waste at the start and end of the warp.

It should help to attract capital investment if the sizing operation could be made independent of the weaving operation, with sized yarn being supplied to a number of firms. Improved sizing would allow the subsequent weaving operations to become more efficient. Independent sizing should also promote the development of new weaving SMEs, as the required capital expenditure to build a weaving facility would be much reduced.

In this case projected capital costs have been based on a total uptake of 200,000 tons of yarn (assuming an 80% average conversion of lint to yarn) and 20t of yarn per loom per year. This represents a total of 1000 looms or $1Bn. Applying the same arguments about access to second hand equipment a figure of $500M has been used for planning purposes.

B.6.3. Processing

In order to expand the processing capacity, investment can be made in new build or in existing facilities although the latter will be more difficult. The new facilities should be based on the provision of state-of-the-art equipment, with all the necessary controls to give consistent productivity and reproducibility. In all models the processing plants would use the best working practices available. Three examples are given to illustrate the costs.

For a facility to produce 75 million metres of shirting fabric per year, initially the facility would produce white and plain dyed fabrics and would consume 18,750 tonnes of cotton yarn at a set-up cost of $51 million. The processing facility will take woven fabric directly from the weaving shed on pallets as a continuous length to minimise hand work at input. The processed fabric would be available, fully inspected, and on large rolls for a garment assembly facility. Other options for this application could be work wear and military uniform production and ladies wear. For a facility to produce 75 million metres of bed sheet fabric per year, converted into flat sheets and pillow cases, the production would initially be set up to produce white and plain dyed fabric, with a rotary printing option included. This facility would consume 29,250 tonnes of cotton yarn at a set up cost of $80 million. The processing facility will take woven fabric in continuous length to minimise hand work at input. The processed fabric will be presented to a fully-automatic cutting, sewing and packaging facility with very little manual intervention. This facility requires an investment cost of $17 million to produce 26 million bed sheets per year and an equivalent number of pillow cases, using 40 operatives. The alternative is to employ 1,400 operatives to sew and pack the same number of units. The investment cost for the automation should be deducted from the above total if the option is to be disregarded.

Other options for this example could be towels, face cloths, wash cloths, curtains and tablecloths, all of which would benefit from the fully automatic assembly of the final products. Finally, for a facility to produce 50 million metres of single jersey fabric, initially set up to produce white and plain dyed fabric, including a placement printing facility and embroidery option, a set up cost of $35 million is required. This facility would consume 13,500 tonnes of cotton yarn per annum. The processing facility will take fabric from the knitting department on large rolls to minimise hand work at input. The processed fabric will be inspected and presented to a garment assembly facility. Other options for this example would be underwear, polo shirts and general leisure wear.

These examples are all based on commodity or continuity products, which need minimum design, input and have quick high volume potential. The second example would be the quickest option to implement and requires the minimum of operator training, however, the unit would not employ a large number of people based on the automatic option. It would be expected that an efficient, high quality running facility would quickly pull along more bespoke manufacturing capability in all areas of textile manufacturing. Based on the figures above, a capital requirement to process 450,000 tonnes of cotton would be over $1.2 billion and would need a minimum of 25 facilities. The value as given is based on production units with economy of scale with high volume and high efficiency, processing

100% cotton products, clearly the use of polyester/cotton blends will require more processing capacity to achieve the target of 450,000 tonnes. They can be stand-alone or part of a vertical arrangement. All making up units should be part of the finishing facilities. It cannot be over emphasised that the importance of high quality training is uppermost in implementing the expansion strategy. This value does not include buildings, emergency standby generator capacity or working capital.

B.6.4. Clothing

Good quality, affordable, 100% cotton woven fabric and high quality polyester/cotton blended fibre woven fabric need to be made available so that the clothing industry might take advantage of the high value AGOA route into the USA. Once these fabrics are being successfully manufactured within Tanzania, then the clothing market with Europe will also be opened up.

The development of the textile industry as a whole would greatly benefit from infrastructural improvement; efficient transport is required by road, rail and sea.

Power, water and telephone communication should be dependable for manufacturing purposes and need to be efficiently installed in the case of new businesses. Most clothing designs and production orders are currently transmitted to manufacturers over the internet. Delivery on schedule is essential and must be guaranteed. Once the infrastructure is reliable, the start-up of small knitting and clothing manufacturing businesses will become more attractive to investors.

Experienced staff are needed to help train local sewing machine operators; work permits for the required numbers of such essential personnel should be made straightforward to obtain.

High precision engineering facilities are required; Dar es Salaam University may, with some outside collaboration, be able to set up courses to assist with the provision of sewing machine engineers and sewing technicians.

Incentive bonus payments might usefully be introduced in selected areas of the textile business. This approach is widely used to increase the productivity of sewing machinists.

Niche markets in Fairtrade and organic clothing may be exploited by organising the agriculture and processing so that a proportion of 100% cotton goods fall into these lucrative categories.

B.6.5. Potential Investment Costs

The target adopted for this study is a total of 250,000 tons of yarn by 2015. The equipment of a modern industry based on the purchase of a mix of first hand and second equipment to meet this target will be high and could well be of the following order over the period 2008-15 (including equipment, buildings and working capital)[1] :

[1] see Indicative Investment Cost table in Main Report for detailed assumptions

	US$M
Spinning	500
Weaving	500
Processing	125
Garment Manufacture	50
TOTAL	1175

However, in practice investors would face a range of choices in the selection of technologies and so of equipment and of whether such equipment is first or second hand. It appears likely however that the creation of a modern textile industry capable of meeting the standards of the world market would require an investment of the order of US$500 million over the next eight years.

Appendix A. List of large-scale textiles producers in Tanzania

	Name of Establishment	Region	District	Location	Ownership	Products / Services	Employment
1	A to Z Textile Mills Ltd	Arusha	Arusha (U)	Unga Ltd	100% private. Shah family.	Knitting and weaving of textiles. Mosquito nets and t-shirts	3,200
2	Kilimanjaro Textiles Ltd	Arusha	Arusha (U)	Corridor Street	100% private (partnership). Locally owned by Mr Mehboob.	Khanga, kitenge, bed sheets	600
3	Sun Flag Ltd	Arusha	Arusha (U)	Themi industrial area	100% private. Owned by Tatyaden Basakhiram and Ravi Bhushan Bhardwaj.	Spinning, knitting and weaving of textiles. Kitenge, khanga, bed sheets, mosquito nets, t-shirts.	2,400
4	Blankets & textiles manufacturers	Dar es Salaam	Temeke	Migeyo Chang'ombe	100% privately owned by six shareholders. JTK Investment is the majority shareholder.	Blankets and suiting materials	133
5	Karibu Textile Mills Ltd	Dar es Salaam	Temeke	Kilwa Road	Shareholder company	Khanga, kitenge, bed sheets	525
6	Lakhani Industries Ltd	Dar es Salaam	Ilala	Nyerere Road	100% private	Printing khanga and kitenge for local market	200
7	Namera Group of Industries Ltd	Dar es Salaam	Ilala	Gongolamboto	100% privately owned by Mazyood Jewellery (LLC) and Cosmos Imports and Exports	Spinning and weaving of grey cloth	600
8	Nida Textile Mills Ltd	Dar es Salaam	Kinondoni	Mandela Road	100% privately owned by Mazyood Jewellery (LLC) and Cosmos Imports and Exports	Spinning and weaving	800
9	Tanzania China Friendship Textile Ltd	Dar es Salaam	Kinondoni	Morogoro Road	Government (49%) and Diequi Textile and Printing Group Ltd, China (51%)	Yarn, woven fabrics, dyed and bleached cloth	1,710
10	Uzi Bora Ltd	Dar es Salaam	Kinondoni	Mabibo Road, Ubungo Industrial Area	C.M. Mashabara and D.G Mbaya	Polyester sewing threat, dyed yarn and polyester viscose	50
11	Moshi Textile Mills	Kilimanjaro	Moshi	Kiboroni	100% private	Bed sheets, t-shirts, towels and mosquito nets	140
12	New Musoma Textile Ltd	Mara	Musoma	Musoma Town	100% private	Spinning, weaving and processing of khanga, kitenge and bed sheets	640
13	New Mbeya Textile Mill Ltd	Mbeya	Mbeya	Songwe Industrial Area	100% privately owned by Raffia Bags	Spinning and weaving of khanga, kitenge and bed sheets	500
14	21st Century Textile	Morogoro	Morogoro	Kihonda Industrial	Mohamad Enterprises Ltd	Kitenge	600

	Name of Establishment	Region	District	Location	Ownership	Products / Services	Employment
				Area			
15	Morogoro Canvass Mill (1998) Ltd	Morogoro	Morogoro	Kihonda Industrial Complex	Abood Soap Industries	Canvas, yarn and cotton waste	388
16	New Mwanza Textile Ltd	Mwanza	Mwanza	Nyakato Area	100% private	Spinning and weaving khanga and kitenge	1,300
17	New Tabora Textile Mills	Tabora	Tabora		100% private	Spinning yarn	350
18	Afritex Ltd	Tanga	Tanga (U)	Gofu Chini	Mohamed Enterprises	Khanga, kitenge, bed sheets	175
19	Amboni Spinning Mill Ltd	Tanga	Tanga (U)	Pongwe	100% private	Cordage, rope, twine and netting	
20	Kilimanjaro Blanket Corporation	Tanga	Tanga (U)	Gofu Industrial Area	Amimonad Gulamali Mirji and Alaudin Gulamai Mirji	Blankets	81
	Total Employment						**14,392**

Source: Ministry of Industry, Trade and Marketing

ANNEX C

SUPPLY CHAIN MANAGEMENT CHALLENGES

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C.1. Introduction

This report is based on eight days of fact finding during a 13 day visit to Tanzania in May/June 2007. The contents of this report were mainly drawn from interviews with a number of stakeholders in the cotton supply chain, predominantly based in Dar es Salaam (DES) and arranged by Mrs Olive Luena of the Tanzanian Gatsby Trust and Mr Ibrahim Seushi, Co-Director in DES. Some additional data was gained from the Tanzanian Port Authority and documents previously circulated prior to arrival in Tanzania.

I was grateful to the companies that contributed to the data collected in this report through personal interviews. They are listed in Table C.1.

Table A.1. Companies interviewed

Organisation	**Contact**
Dar Es Salaam Port Authority	Mr Rugaihuruzza Jason, Port Manager
Tanzania International Container Terminal Services	Mr Cassian Ng'amilo, Terminal Manager
African Pride Textiles Mills Ltd.	Mr Nilesh Bhatt, Director
Cami Industries	Mr Mathews Malayatoor, FBME Bank Manager
Zim Shipping Services Tanzania	Regnold George, Sales Manager
Tanzania Revenue Authority	Juma Hassan, Customs & Excise Dept
Swissport Air Freighting	Mr Daniel Simkanga, Cargo Services Manager
SNV NotCo Ltd	Mr Omar Abdulhalum, Operations Director
Tanzanian Cotton Board	Mr Thomas Fille, Director of Regulatory Services

C.2. Report methodology

Although many of the interested parties are represented in this sample a limitation of the study is the small number of organisations that contributed to forming an informed and representative opinion of the supply chain management issues and challenges confronting the Tanzanian cotton sector.

The overall aim of the study was divided into a number of objectives. This report covers part of Objective 2 through Individual Terms of Reference which were stated as:

1. Review current distribution logistics for selection of existing textile factories.

2. Examine the current parameters of Dar es Salaam and if relevant other ports from an export perspective.
3. Review distribution costs within the region (East Africa and SADC, including South Africa).
4. Analyse the current supply chain from to the US and the EU and describe Tanzania's competitive position and the scope for improving it.
5. Describe the production planning arrangements which would contribute to a more efficient supply chain.
6. Identify the capital costs which would be necessary to achieve a significant improvement in the supply chain.

Each of these objectives will be assessed and an indicative conclusion summarised based on the findings and prior international supply chain management experience of the author.

C.3. Background

Although it was unclear from the overall aim of the study it seems to be implied within the study that a possible opportunity existed for fashion garment production be included as a future aspiration of the Tanzanian textile sector. If this was the case, then a number of important criteria would need to be achieved, not least of all reliability in supply and cost of supply (not just garment cost) to the destination retailer, whether in the US or Europe. For most fashion ranges there is a 7-8 week selling season repeated throughout the year. This means a 49-56 day selling season where reliable and repeatable deliveries are a prerequisite. However, an alternative option is to target production of continuity products, such as blue cotton shirts, white knitted underwear or white bed linen which are available all year round but vary in volume requirements depending on monthly demand. The aim of the project informs the context in which the supply chain management study is undertaken. But without any particular direction it had to be assumed that an aspiration of the Tanzanian cotton and textile production was to add some degree of value to the supply process that would be predominantly exported.

The largest majority of cotton (95%) is produced in the Western Cotton Growing Area of Tanzania, located approximately 1,200km from the eastern seaboard port of Dar es Salaam. Most of the cotton is produced on small holdings typically between 0.5 to 5/10 hectares in size from approximately 400,000 farmers. This is a very fragmented group of producing farmers that supply their crop to 68 ginners also based in the west of the country. The ginners, who produce cotton lint, then currently export over 70% of their cotton production predominantly through the port at Dar es Salaam. The remaining 30% of cotton lint production is used locally within Tanzania to produce low grade cotton cloth for use in such products as khanga, a traditional woman's outer garment.

Most of the transportation occurs via road transport as the internal railway system has suffered many years of neglect and under investment leaving it to all intents and purposes redundant. There appears to a complete lack of suitable wagons, container carriages or reliable heavy haul locomotives as well as useable track infrastructure.

The road infrastructure has benefited from some investment. Although it was not possible to verify the condition of the route from the regions where the ginners are located, the road westward from DES to Morogoro (200kms) was of a high standard and suitable for road trucking. It was reported that of the 1200km distance from the Western cotton producing and processing region to DES approximately 300km of the route is not a tarmac road surface. Also of particular relevance, is the condition of the access roads around the port

area of DES which is very poor, ridden with large pot holes and general surface deterioration and totally unacceptable for the rapid movement of containerised or heavy bulk carrying trucks.

C.4. Findings from the study

1. Review current distribution logistics for selection of existing textile factories

Most of the cotton produced as lint, cloth or final product is moved around the country using road transport. Cotton lint that is destined for export is transported as bulk bales each weighing between 180kg to 220kg to DES. It is then containerised close to the port area prior to shipment. Similarly, final products will be containerised at the factory prior to movement to the port. Consequently, the containerisation and the port play an important role in the total supply considerations for export of Tanzanian cotton and textile products. Similarly, imported cotton cloth used for conversion into textile final products is dependant on an efficient and effective importation process. The stakeholders that contribute to the import and export of product include the Tanzanian Port Authority (for bulk goods), the Tanzanian International Container Terminal Services (for managing the container port), the Tanzanian Revenue Authority (for customs clearance including collecting excise duty) and the Freight Forwarders, Shipping Lines and Shipping Agents. In essence this is a planning activity coordinated by the textile factory or its agent.

Most of the procedures and documents necessary to move products in and out of the country are manually based, requiring a personal visit to the Customs offices, and seem fraught with error and delay caused by many reasons. All of the interested parties that contributed to this survey seem to agree that the system could be radically improved with the use of an internet based system that would remove any possibility for personal influence from particular agencies to further there own motives in all aspect of the clearance process. It would immediately be beneficial to introduce simple measures that are publicly reported and accessible for public scrutiny. These measures could be translated into Service Level Agreements that would act as incentives, particularly to the public regulatory authorities, such as the Port Authority or Customs.

As an example from a personal observation, there seemed to be a significant delay in getting ships from the outer port anchorage to available free berths in the port. There may be good reason, but bringing ships into a holding area inside the port area, for instance, would improve berth occupancy and therefore throughput. Although this would put pressure on other bottlenecks at the port it is simple cost free solution. A more strategic issue is an overall review the DES port facilities. Not only is the access a major concern, but separating import and export flows within the current five gate access points would improve throughput. The stevedoring, discharge and loading activity, to be improved with the addition of two recently acquired cranes is impressive, particularly given the limited space available at the port. Also, the lack of movement of freight by train significantly contributes to the congestion of moving product away from the quayside area. However, introducing a new access road that connects directly with the west bound road system from DES and passes the Export Processing Zones (EPZ) is a vital requirement to help move products away from the port area. It would also overcome the very poor state of the access road.

However, it was generally agreed that the greatest delay was created by the customs clearance activity that had been outsourced to a third party. That service provider was not visited as part of this survey. But with a measuring system in place to assess

clearance performance benchmarking to international levels would focus management attention to resolving the causes and effects of the bottleneck and alleviate unnecessary delays. Also using synchronised database information from originating source port or country would also help eliminate current unnecessary administrative delays. With imports via the port, for example, it was suggested in a number of interviews that typically 20% of clearance occurs in seven days and 80% occurs in 21 days.

The air freight facility from DES airport was operated by a commercial provider and the airport provides a very important resource for future international textile sourcing from Tanzania. About 20% of throughput is from exports and 80% from imports. There is a negligible amount of textile products exported by air whilst some cloth and garments are imported. Most of the exporters of air freight use passenger carriers and, interestingly, there are dedicated freight aircraft that bring in other imported products but regularly leave for their onward flight empty. This obviously could provide for a discounted cost for transport into Europe or elsewhere as the return flight cost would have been covered by the inbound flight cost.

2. Examine the current parameters of Dar es Salaam and if relevant other ports from an export perspective

The normal parameters that buyers of exported products rate as very important are reliability of delivery of products from the factory of production to the warehouse in the country of sale. The reliability has a large impact on the reputation of the supplying country from the point of view of the buyer. Consequently, the internal distribution system (i.e. the road network), the trucking delivery performance, the port performance, the speed of customs clearance, and the frequency and reliability of shipping to the destination country are all contributing factors. The buyer would benchmark all of these combined components against competitive alternatives in arriving at their purchasing decision.

From the finding of the study, the current situation from an export perspective would lend itself to the consideration of supplying continuity products but the supply of fashion garments is not currently achievable. However, with future targeted and significant investment in infrastructure and textile production capability and capacity, it could be an option for the future.

3. Review distribution costs within the region (East Africa and SADC, including South Africa).

Distribution costs obtained from sources during this visit suggest similar transportation charges to other Su-Saharan countries. As an example, a 20TEU container from DES to Felixstowe was quoted as US$1200. . The Freight Forwarders fee was quoted as US$150 per container and a 20TEU container could carry approximately 15,000 shirts. The cost per shirt would beUS$0.09. The European Retail Price of the shirt would be US$45, typically with a 60% margin equivalent to US$19.50 UK landed price with significant financial penalty for late or early delivery. The location and port performance of DES as a feeder port to the other regional RTW hubs is where the competitive advantage will be derived and not the absolute distribution cost. This cost is now seen as marginal and comparable with other distribution centres in the region.

4. Analyse the current supply chain from to the US and the EU and describe Tanzania's competitive position and the scope for improving it

Most of the import and export of products by sea and air from DES to the US and Europe will include a transhipment activity. Dedicated air freight carriers use Nairobi, Kenya as the hub and follow through transhipment takes place from there. Central Europe (UK or Italy) is achievable in two days. For sea freight, DES is well placed in the global distribution activity. Most shipping lines will use a dedicated a Round The World (RTW) hub, which for services to Europe and the US via the Suez Canal are normally based in the Arabian Peninsula region at locations such as Oman or Djibouti. Typical delivery times are: Felixstowe (UK) in 28 days and Shanghai (China) in 30 days. As a comparison, China to the UK is normally quoted as approximately six weeks, depending the chosen route and ship availability.

Larger vessels to the US and Europe, such as the recently launched 45k tonnes Emma Maersk (and her seven similar sister ships), which is 400m long by 56m wide and capable of carrying 11,000 20 TEUs, are too large to travel through the Suez canal and travel via South Africa to other RTW hubs including Felixstowe (UK), Rotterdam (Holland) and the US.

Since many of the English and Continental European container ports are operating at or near capacity, some logistics companies use a combination of smaller Mediterranean ports in Spain, Portugal and southern France integrated with the Pan European rail system, including the Channel Tunnel to service the UK and northern Europe. These ports are within easy reach of shipments from Tanzania.

Overall, Tanzania through the sea port and airfreight facilities at DES, is well placed to provide quicker delivery times for European and US buyers.

5. Describe the production planning arrangements which would contribute to a more efficient supply chain

Production planning is a key activity to the efficient movement of goods and raw material within the supply chain. The importance of coordinated and synchronised information within a supply chain is fundamental to the profitability of any sector in the global trading environment. The use of information technology will enhance the exchange of information in a format that overcomes barriers created by traditional manual administrative processes, which normally involve significant human intervention, errors and consequential delay. A textile supply chain is unique in the extended number of processes involved in the whole supply of raw material to the final customer (consumer). Effective production planning that is coordinated between each component of the supply line, will vastly improve the quality of timing and decision making by management involved in planning process. The effect of improved production planning is to minimise stock holding between each component of the supply chain and improve the throughput times and speed of delivery.

Working back from the shipping line, there is extensive use of global satellite positioning technology to accurately plan and monitor the arrival time of ships to the anchorage point outside the port of DES. The Port Authority of DES holds a regular daily 2pm meeting with shipping agents, shipping lines and container port representatives to update the anchorage and berth schedule. Based on this information, the quayside preparation of bulk and container loading (exports) and discharge (imports) is determined. Prior to this activity the production planning within

the factory is linked to the booked ship arrival date. But for imports where most delay occurs, the one factory visited carried a month's stock of imported grey cloth to buffer against the unpredictability of supply from the importation process.

All the production planning systems observed were based on manual paper based systems. Assuming this to be the general norm, the situation could be vastly improved by the use of relatively simple production planning systems. At a local level, it could be an investment in the use of spreadsheets for the cost of a one off licence payment. At a broader level between members of the supply chain, it could be an internet based system that could be benchmarked on similar systems used in other sectors, such as European food multiple retailers and their suppliers, often sourcing from offshore locations. The ability to monitor closely the movement of product from one supplier to the next, together with the associated measurement benefits accessible to all users, would provide an immense competitive advantage for the Tanzanian cotton and textile product sector.

C.5 Recommendations

1. Identify the capital costs which would be necessary to achieve a significant improvement in the supply chain.

From the above analysis, there are a number of capital cost investments necessary to achieve significant supply chain management improvements for the Tanzanian cotton and textile sector. These include the following:

2. Dar Es Salaam Port internal facilities, access and link road improvement

This would be a significant multi-million dollar investment project that would need significant professional expertise from a reputable road construction industry. A feasibility study would need to be undertaken to identify all the necessary influences and factors required to be included in the main project, together with the phasing of the different components of the project. Typical costs would be estimated between US$150m and US$300m, but would need a project management consultancy company to determine infrastructure and capital costs and planned work requirements.

3. Information Technology

The opportunity to gain an integrated and coordinated production planning system available to all stakeholders across the supply chain should be pursued with a high priority. This is more of a fragmented problem as many of the organisations interacting into the supply chain are commercial enterprises.

The initial project would be to introduce an electronic web based customs process with appropriate public and restricted areas for the different groups of users. The technology platform used in the system should be readily accessible to all potential users. It should be based on a current working IT based customs system, such as used in the UK. Given that the operators of the Tanzanian International Container Terminal also operate the Felixstowe container port in the UK, a feasibility project should be undertaken to identify the IT requirements for

DES Port and customs authorities. Again, a project management consultancy company would determine infrastructure and capital costs, but an estimated budget of at least US$50m is likely.

Further, there will be a significant training requirement for all users of IT systems. Each organisation would normally bear the cost, but some fiscal incentives would be necessary to encourage their uptake and for the purchase of computer equipment and associated software. This should be included in Tanzanian Government taxation policy recommendations.

4. The Railway network

This is the major weakness of the Tanzanian transportation system, but also the greatest opportunity. The current system is essentially redundant and is a legacy of Chinese, German and British influence. It is a narrower gauge track than the European network.

The most pragmatic solution is to construct a dedicated track and signalling network to European gauge from DES port westwards to the western districts of cotton growing and cotton lint production. This track could use European diesel locomotives for heavy haulage and could be part funded by countries such as Congo, Rwanda, Malawi and Burundi that use DES port. There is also the possibility to introduce regular scheduled fare paying passenger services. The cost will be significant and likely to be over US$1b over a 5-10 year period and would need international partners, such as the World Bank, to provide this level of investment. A project management consultancy company would be required to determine infrastructure and capital costs and planned work requirements.

ANNEX D

Design capabilities and potential

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D.1. Introduction

This report presents the results of research into the design and marketing capabilities within the textiles sector. It is difficult to provide exact figures for the numbers of people involved in the textile and clothing industry, as many businesses are not registered with any of the government departments. However, of those companies registered between 2003-2005, just fewer than 60% of businesses in Tanzania are involved in the manufacture of textiles and 0.1% is involved in the manufacture of wearing apparel. 92% of the Tanzanian businesses are individual/family owned, of which about a third are owned by women. Dar es Salaam has the greatest concentration of private sector business units (24%) (Central Register of Establishments, 2007).

A study by TGT has already outlined a number of significant issues that constrain current development of the industry (both domestically and externally to Tanzania) and also identifies opportunities that could be exploited. A project team has been organised to review each of these issues. The objectives for the study on design and marketing in Tanzanian textiles industry were to:

1. Review current design capabilities for both garment and household textiles
2. Consider how these capabilities could be developed with regard to both small-scale (informal sector) enterprise and larger scale and with regard to different components of the market
3. Advise on steps which could be taken to link local designers with international designers to create two way flow of design concepts
4. Relate design potential to the nature and flow of raw materials and their selection.

D.2. Research method

Based on the principles of the five phased new product development processes, and the necessary components for the successful completion of the phases (see table 1), a qualitative, semi structured, in depth interview schedule was constructed. Responses were recorded by notes written during the interviews, which lasted between 40 minutes to two hours.

Table 1: design capabilities

phase	what each phase needs
research and analysis	Sources of inspiration: magazines, trade fairs, shopping, consumers, past sales figures, current resources (machinery, finances). To develop future trends for one year ahead: identify new colours, new fabrics, new details; identify staple colours, fabrics and detailing. Knowledge/understanding of consumer attitudes. Ability to differentiate products into good, better, best range of products.
synthesis	Pattern cutting skills, knowledge of fabrics, fitting skills, knowledge of or access to size charts, development of quality control measurements. Knowledge/understanding of consumer requirements. Production staff to make to required standards. Fabric. Machinery. Finances to buy raw materials and technology.
selection	Understanding of consumer requirements. Understanding of retailer requirements. Retail buyers. publicity, press to attract buyers, methods of presenting new collections, e.g. fashion shows, trade fairs
manufacture	Order numbers; production staff to manufacture to production numbers; fabric; quality control measures; finance
distribution	Buyers; press - publicity and promotion, brand; consumers (knowledge of and access to); marketing knowledge; selling mechanisms - visual merchandising (labels, bags, packaging, display)

The Interview schedule

- How do you get inspiration for new concepts?
- Do you conduct any market research?
- Where do you sell? How?
- Do you promote your products… how?
- What are your company resources?
- What business help/support do you get?
- Where do you get the raw materials?
- What help do you get in design/production**?**

The sample interviewed was the following:

Government:
Ministry of Industries and Trade
Ministry of Trade (AGOA)

Handcraft/Fashion Design producers:
Marvellous Batik
Digna Fashions
Renzo
Batik Centre
Hassanal
Manju

Factories: EPZ Millennium Business Park
Namera Group of Industries
NIDA
CAM Apparels

African Textiles
Urafiki (China Tanzania Textile Mill)
Mr Mehboob Ismail (Manager of Millennium Business Park)

NGO and Associations:

TANCRAFT (Tanzania Handcraft)
ADAT (Artisans Development
MIKONO

Educational institutes:

College of Engineering and Technology, University of Dar Es Salaam
VETA (Vocational Education and Training Authority)

D. 3. Results

Objective 1: Review current design capabilities for both garment and household textiles

Interviews with the SME's and the factories were examined. It appeared that the handcraft sector was very aware of the need to upgrade their design skills to achieve greater commercial success. The larger manufacturing sector appeared to be less concerned. They had invested in computer aided design (CAD) technology, but did not utilise it to its full capacity, e.g. to develop collections or ranges as they manufactured according to designs and materials supplied or demanded by the buyers. The large manufacturers, therefore, used the CAD technology as a tool to communicate, negotiate and speed up the process of manufacture. They invested in design by employing designers, but the designers were invariably from countries outside of Tanzania. All the factories trained their operators (under variable conditions), but they did not appear to engage in training designers.

Table 2: Comparison between the SME's:

	Marvellous Batik	Digna Fashions	Renzo	Batik Centre	Hassanali	Manju (at Mikono)
company resources	TGT and access to funds through quick loans, membership of ADAT	a salesperson and batik printer. Access to tailors, embroiderer. Also, access to TGT for marketing and to attend exhibitions, HOT and TANCRAFT for information about exhibitions and working together	tailors and salespeople, husband also a sales director in the company	membership of ADAT: access to machinery and marketing/business information	tailors to stitch clothes and access to finance through sponsorship deals; RODDS Tanzanite, TIGO	studio/workplace in Mikono
business support help required	manufacturing capacity support to help meet export order demands	Tsh 5m to buy fabrics, allow her to keep a reserve stock of fabric and develop her business to supplying other retailers (and wait for a month for payment)	marketing, and in finding means to export internationally	·Design skills: home décor or fashion training for own. ·Marketing skills: Methods of making links with the market and promotion	more sponsorship, bank loans unavailable to him for religious reasons	100-50 million Tsh to upgrade his business
source of raw materials	nearly all locally produced	both Tanzanian fabric producers (from who she regularly buys) and abroad as they are fashionable now	South Africa, Ivory Coast, Dakar, Senegal, DRSC but will not use much Tanzanian fabric because of the quality, colours, textures, designs or patterns. The Tanzanian fabric is not acceptable for her clients as its rough and does not drape well.	local factories	Fabrics that he has used include the bezein and kitenge; he buys fabrics personally and from people who have bought fabrics in (imported). Does not like to buy local as not enough variety/design	fabrics from abroad (the best according to Manju), some fabrics are from local shops near Askgar and some West African materials. He prefers to use cotton or linen and buys wholesale/retail.
typical price range of products	a small bag may be 3,000, medium bag 7,000		$60 to $100 for occasion-wear or ceremony wear	(in Tsh) from dresses 35,000 to 200,000, a small bag may be 1,500, medium bag 7,500 and large bags from 10,000	Evening gown $100 minimum, Wedding $1300, Suits (men) linen $150; linen is expensive in Dar, a ladies linen corset and trouser suit Tsh 80,000, corset Tsh 45-50,000.	18000 Tsh (about $17) up to $120 depending on the materials used.
company size (employee numbers)	16 permanent, four when extra work required.	two permanent, seven self employed	25	11 people, eight of whom are permanent	three	10 people
company age	about 15 years	12 years	eight years	10 years	2.5 years	10 years

Table 2: Comparison between the SME's (*continued*):

	Marvellous Flotea Co. Ltd.	**Digna Fashions**	**Renzo**	**Batik Centre**	**Hassanali**	**Manju (at Mikono)**
getting inspiration	difficult to ascertain: response to materials	watching soaps, looking at what the stars are wearing, designs from people who come to her.	travels, fabric, other designer's works, customers bring their own ideas, magazines and TV	internet search for comparable products.	intuitive but different if client/corporate. Clients came with specific ideas and visuals, corporates want visuals, e.g. costumes for an event… use internet to get pictures. Fabric inspirations are from touch and feel, some use of handcraft, e.g. masai beading, for the Mama Africa collection or couture collections,	internet, magazines, newspapers to see what designers are doing, how they've done it and information about successful people
market research	proactive in collecting market information by emailing customers and buyers for feedback from them to improve product quality.	talking to her customers	none ascertained	no consumer research, or estimation of potential market sizes	feedback from clients	customer feedback
selling mechanisms	her shop, wholesales, export orders to the USA, exhibitions.	her shop and trade exhibitions	currently one shop in Tanzania, preparing a second in Mbezi and negotiated a third in the New Africa Hotel. She has exhibited at one trade show: Saba Saba Government show in July 2006	Batik Centre and also at ADAT, a small outlet in the Kingamboni district, then several customers and Houston Inn	does not retail, no ready to wear or grading of sizes, sells at his studio (there is a fitting service in his studio)	Mikono shop and exhibitions
promotion of products	exhibitions and trade fairs, website	through word of mouth, attends trade fairs and exhibitions and participation in the Miss Exhibitions (competitions).	customers require individual designs; trade fair not the most appropriate use of her finances	trade fairs in Uganda, several trade fairs in Tanzania, Marco Tanno, TanCraft	his website, fashion shows for charities	Mikono shop and word of mouth

Table 2: Comparison between the SME's (*continued*):

	Marvellous Batik	**Digna Fashions**	**Renzo**	**Batik Centre**	**Hassanali**	**Manju (at Mikono)**
training	embroidery, stitching and smocking at school, SIDA (batik, stitching and product development - six months course), Tanzania Business Textiles Women's project (UNIDO and NDP), one year management skills and marketing with Hans Seidel Foundation. Ronald Brown Institute (at Pretoria University for entrepreneurial skills.	batik process from mother and also further training in batik and sewing and business orientation from colleges in Tanzania (courses were up to six months long).	training in making kitenge from the factories, hotel and business management college for business management training in Dar and then to Ohio University for degree in Business Management	batik and surface design	trained to be a doctor initially. Has some training in embroidery, stitching, hand weaving	graphic designer - cartoonist, in the advertising industry for eight years, educated to A level standard. Training in tailoring and sewing from his mother and also his own experience
annual income	about $20,000	10m Tsh (about $10,000).	could not estimate	20m Tsh	not estimated	30-40m Tsh
product offerings	clothing, interiors products, basketry, bags, sandals	clothes and accessories: baskets from craft ops, beads and jewellery from Kenya, Arusha.	clothing and accessories	tailoring, stitching services and interiors products such as pillows, curtains, bags, bedcovers, bed sheets and other wares for men and women.	Ladies wear and menswear	Men's and ladies outfits and belts, shoes, key holders

The table below is a comparison of the interviews at the large factories that illustrates that the larger organisations employed designers and made use of computer-aided design. It was apparent that design was more about amending currently popular designs (through amending colour, rather than new prints etc) or commissions by buyers.

Table 3: Comparison between the factories

	NIDA/NAMERA	AFRICAN PRIDE	CAMI	URAFIKI
company size (employee numbers)	up to 200 (estimate)	111 people employed at the factory, 45 are permanent, 26-27 are trainees and the rest are casuals.	1000: also two joint ventures as part of the Tanzanian operation which serve Tanzanian markets (police force and hotels/work wear uniforms).	difficult to estimate: about 300; 50-60% permanent staff and 30-35% casual
company age	recent start up, but took over from a factory started in the 1970s	started in Jan 2005	Tanzanian factory started in December 2006.	over 40 years
owner's background	Pakistan, 50 year's textile industry experience	from India, his father in the textiles industry for 55 years, he has 16 years textiles industry experience	part of a group with factories in Cyprus and Bulgaria. Has knowledge of vertical operations through other factories.	Chinese
product offerings	kanga, kitenge, bed sheets	vitenge	apparel	vitenge and kanga and 48" bed sheets, for schoolchildren and bleached fabrics for use in tie and dye and batik
training	not really, hires those who have received training from elsewhere.	takes pace at his factory, gives a stipend for the time.	conducts sewing machine operator training at the factory	none mentioned
source of raw materials	kanga/kitenge: locally grown cotton. Bed sheets: imported wide width grey cloth	grey cloth from India/China; 100% cotton as well as 100% polyester (none from Tanzania)	China	local cotton and also grey cloth imported
getting inspiration	past good selling design	instructions from buyers; Holland or Nigeria	buyers hand over a design package	past good selling design
design equipment	separate design studio within NIDA factory with computer aided design: photo shop and some hand drawing facilities in case of computer failure. Archive of previous designs to aid in product development.	designer and ATex CAD software, colour separation	design studio with CAD, hand drawing equipment, embroidery room with embroidery machines, lay marker and lay plotter.	CAD machines
designer employed	yes, from Pakistan	yes, from India	yes, from Europe	2 or 3 designers
market research	rely on buyers	rely on buyers	rely on buyers	rely on buyers
selling mechanisms	agents to export	agents, some retailers	mainly export but also some to home market	export
export to	Mozambique and other African countries	70% export to Kenya, Zambia, Mozambique, etc; 30% local	mainly USA	Zambia, Mozambique, Malawi and Zimbabwe;

The following attributes of the design process that help companies compete have also been used to further examine the companies visited.

- Understanding of consumer requirements (needs and wants)
- Method of distribution
- Relationships with retailers
- Relationship with fabric suppliers
- Flexibility of production
- Ease of access to manufacturing locations
- Design skill
- Innovation skills
- Speed of manufacturing process
- Promotional activities

Understanding of consumer requirements (needs and wants)
The SME's keep in contact with their customers, sometimes through personal contact, sometimes through correspondence. Lack of a design training school limits any deeper analysis of consumer trends to anticipate future tastes. The large manufacturing factories relied on buyer or agent for design ideas. Although they have CAD facilities, they seemed to be amending past successes instead of creating future new successful products. Relying on buyer's understanding of their customer and setting the brief makes them very susceptible to the fortunes of competition from other low priced manufacturers. CAMI group had customisation facilities and this may be further developed.

Method of distribution
All SME's sold products through their home or studio space. Mikono was an example of tourist attractive space to view craft people working at places of creative work and thinking. Many used exhibitions and trade fairs. Trade fairs were not always satisfactory and require a careful understanding of what can be gained from showing at an exhibition. Flotea (Marvellous Flotea Co Ltd) has been very successful and has capitalised on consumer response to her products. However, she too felt that she had reached a stage where she could not progress on her own. The large factories visited all exported, although there was some inland selling (following government guidelines).

Relationships with retailers and fabric suppliers
There appeared to be no relationship to be established between retailers or suppliers. Each is striving to manage the competition. There is no support for new designers through grants or access to materials for collections as in Europe or the Asian sub-continent.

Flexibility of production/ease of access to manufacturing locations/speed of manufacture
Production capacity at all sectors (large or small), once reached, appears to have a ceiling, setting limits and therefore constraints on developing the business. The SMEs individually produced in small volumes but, by networking, may be capable of raising the production capacity.

Design/Innovation skill
These are limited to amending the current knowledge. While the large manufacturing units have design ideas brought to them by buyers, the handcraft sector does not have this, unless they too are approached by a large organisation's buyer. The factories can attract buyers for volume, cost and quality of production, the handcraft does not

have this and they have to attract in terms of the product itself and the potential to create something unique. Lack of design training and access to research limits the creative thinking through of projects.

Promotional activities
Nearly all handcraft sector companies attended trade fairs or have websites. This did not appear to be the case for the large scale factories.

Objective 2: Developing the capabilities with regard to both small-scale (informal sector) enterprise and larger scale and with regard to different components of the market.

Following conversations after the first round of interviews had been completed, the **Tanzanian cotton value chain** was understood by the project team to be as below:

Figure 1: Tanzanian cotton value chain

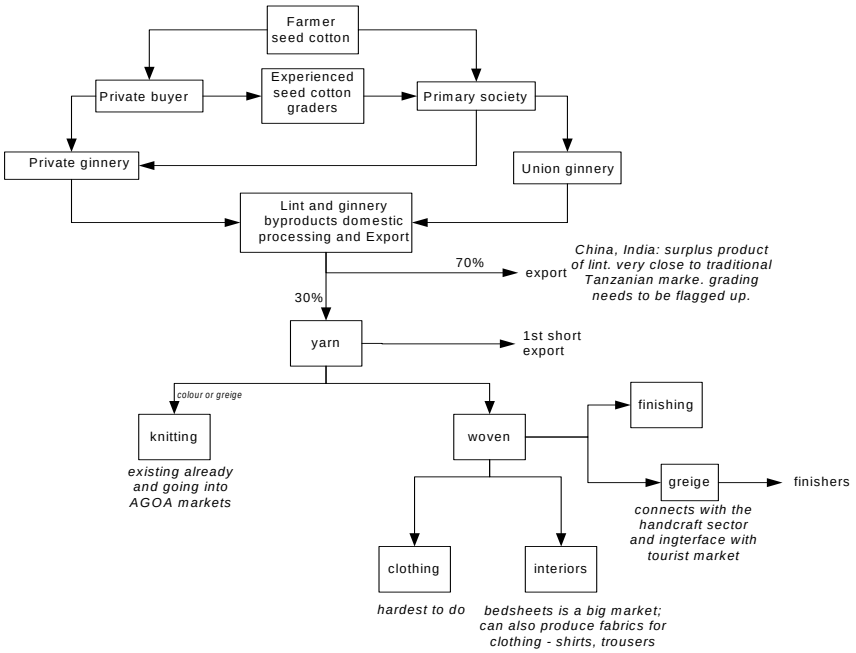


Figure 2: A structure of the UK fashion and textiles industry (Easey 2005)

From this diagram it may be noted that there are key support industry elements that help facilitate the textile and fashion industries. From the interviews conducted, it appears that similar sets of players in the textiles industry do exist in Tanzania, albeit at very small sizes and fledgling stages. There are also some lines of communication, these are illustrated in diagram.

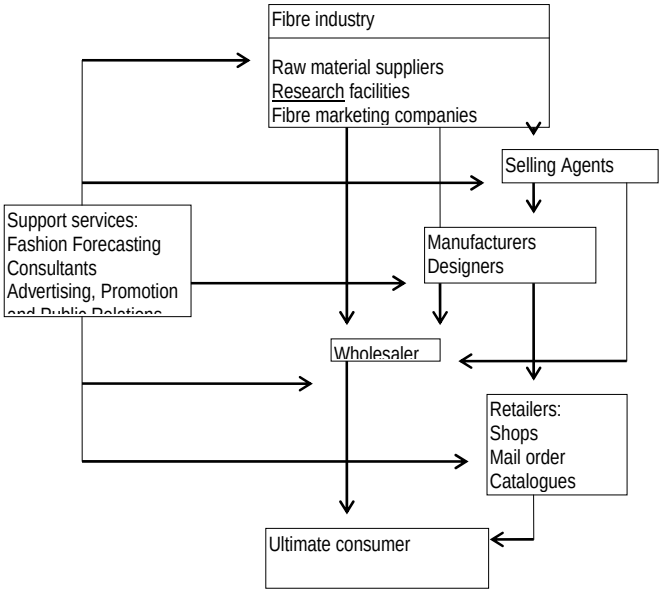
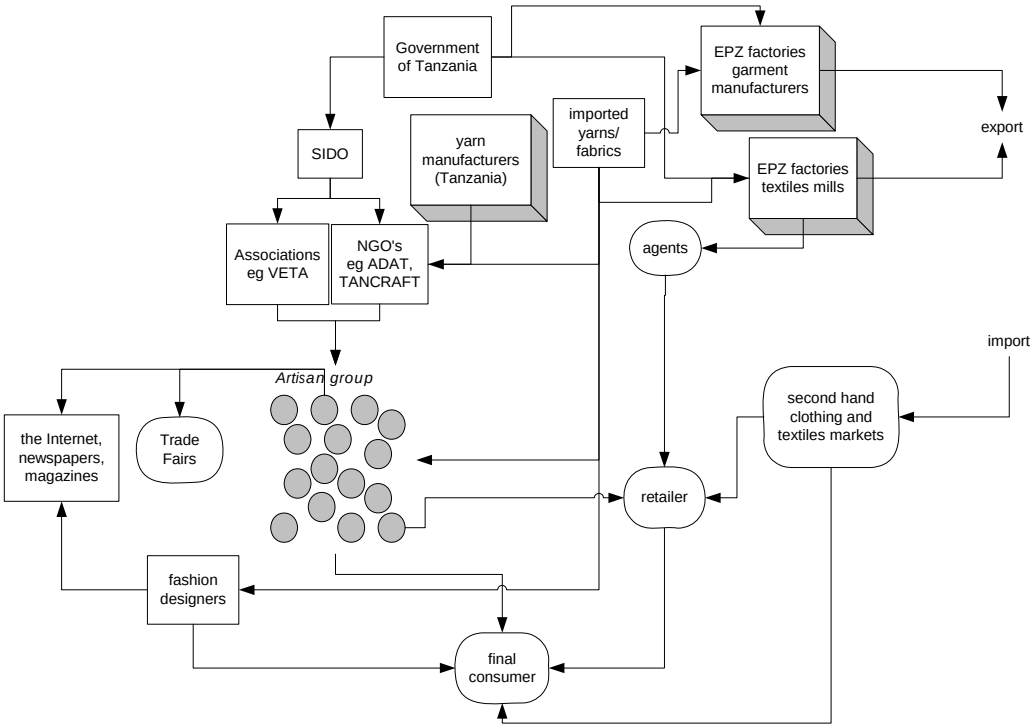


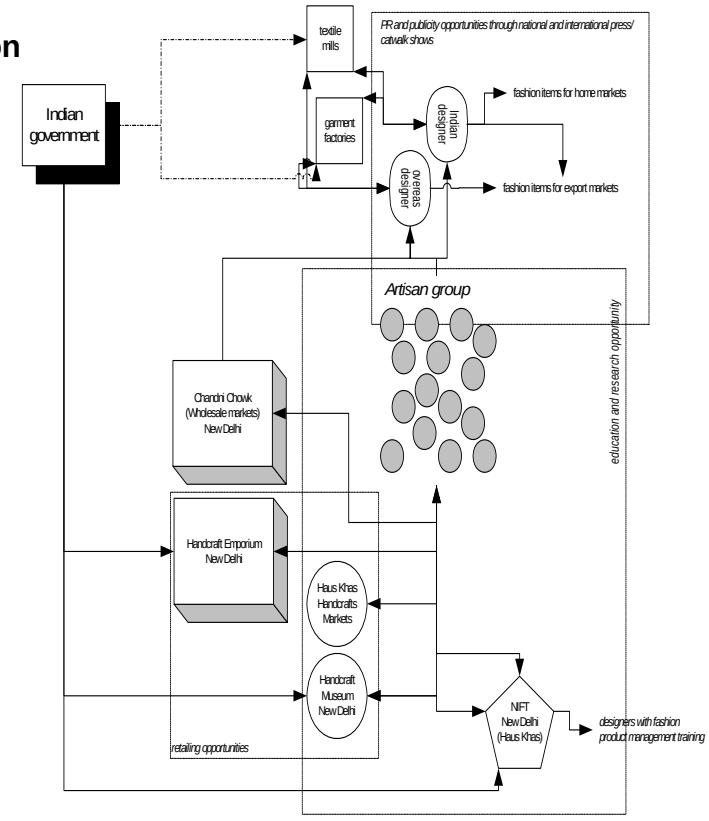
Figure 3: Structure of the textiles and fashion industry in Tanzania (Dar es Salaam)



The majority of the businesses are the small to medium sized enterprises or even micro enterprises (CRE 2007); many are in the handcraft sector and the second-hand clothing. This is a situation not unlike that of India's textile and clothing industry. Each group, however, acts on its own; there are few links between groups, raising little opportunity for innovation or creative ideas.

Figure 4: The Indian Textile and fashion industry structure

The Indian structure has more links between groups and there is a greater mix of different sizes of groups and activities coming together. Research is made possible through the links between educational establishments with industry of all sizes. This raises the potential to develop home grown talents and skills. The links also make it attractive for an overseas buyer to source manpower or skills from, as it creates easy access.



The Indian textile, fashion and handcraft sector developed together to their mutual benefit. In the late 1970s, the government established some large handcraft retail outlets which began to draw interest from tourists. In 1985, the government of India and the Fashion Institute of Technology (New York – a prestigious fashion institute with world wide repute) set about to create the National Institute of Fashion Technology (NIFT). NIFT has five centres, each is located in a centre of textile handcraft excellence (e.g., Delhi, Mumbai and Kolkata) and each centre has strong links with the respective handcraft sector. By engaging with the sectors, NIFT produces designers who have an understanding of design management, the handcraft producers have products that are appropriate for their market and use their skills. Moreover, graduating designers who go on to work in industry maintain their links and are knowledgeable about where to source skills. To achieve this, the government have been very proactively involved: there is a minister for textiles who champions the industry and oversees the NIFT centres (as well as appointing director generals) with a structure hierarchy very similar to that at VETA.

To create interest in the Indian handcraft sector, it has been heavily exposed to the tourism market. There is a large government retail outlet (Khadi and Village Industries Commission (Ministry of Micro, Small and Medium Enterprises, Government of India, http://www.kvic.org.in) for handcraft in the centre of the New Delhi city, this is in conjunction with the Arts and Crafts Museum, New Delhi, with the remit of preserving cultural heritage and skills by developing relationships with craftsmen whose visits to the museum enable them to meet new urban patrons, as well as to either further their own skills or to innovate. If one has more time, there are smaller, cheaper outlets for the handcrafts outside of the main city centre areas. There are also regular organised study tours operating for designers or public with interest in Indian handcraft (tours such as travel to Rajasthan, or Amber, where designers are taken to villages to see handcraft practised).

The Indian fashion industry has developed over a period of about 25 years and there are an increasing number of management related centres of study for postgraduate education in fashion and fashion management. As the production of fashion is becoming more global and thus more collaborative (with buyers, designers and manufacturers needing to understand each other's needs and constraints), the major export zones are beginning to develop courses in management for the fashion professional (of any discipline). An example of this is the Indian Apparel Export Council and their INSTITUTE OF APPAREL MANAGEMENT in Gurgaon, New Delhi. All the major institutes (including NIFT) are seeking to create MoUs with international universities to develop collaborative programmes or research.

Objective 3: Advise on steps which could be taken to link local designers with international designers to create two-way flow of design concepts

Major challenges face the Industry: competition from China and India and is the second-hand clothing market industry. A lack of design training impacts on creativity in product development (how inspiration is drawn), range planning (what styles and how many), product differentiation (creating market and pricing levels), future trends (an anticipatory approach) and understanding of consumer trends (product quality). For the craft sector to develop along the Indian scenario there needs to be the development of educational centres and market research resource centres and development of tourism for the handcraft sector.

- Establish a ministry of textile who will champion the industry
- Establish city centre handcraft store (for the passing tourist)

- Establish study tours aimed at overseas designers and artists to view handcraft as it is being made
- Develop a research centre to share market knowledge, as well as skills knowledge (perhaps this might be web based and linked into a world-wide community to allow for a large number of skills to be examined)
- Develop MoUs with overseas universities
- Establish scholarships for students to study abroad
- Establish 'sabbaticals' for designers and teachers to come to Tanzania and teach their skills
- Establish links between retailers and suppliers
- The second-hand clothing market is prevalent throughout many countries in Africa, a recent study of the Malawi experience (Mhango and Niehm 2005) propose closer ties between the retailers in Malawi and the second-hand clothing retailers. In the spirit of handcraft and conservation, perhaps closer ties could be drawn between the second-hand clothing and handcraft sector where new products could be created out of old. This approach has already taken place in the UK with designers making new designs from old clothes (e.g. Jessica Ogden, NoloGo label, Tord Boontje and Nadia Ballan). There are also ethical fashion shows where there are companies and networks presenting their items (http://www.ethicalfashionshow.com/langues.htm#) and Estethica (at the London Fashion Week www.**londonfashionweek**.co.uk).
- Establish a museum of handcraft that has links with the educational institutes as well as the handcraft sector.
- A series of promotional tours may be organised in countries where there is interest for handcraft. This will be necessary to create reputation and knowledge about Tanzanian handcraft. Large fashion organisations should be invited to such evenings, e.g. CEOs of high street (mass market) retailers currently selling craft based products in the UK, such as Paper Chase, Oasis and Monsoon (Accessorize), retailers interested in ethical fashion (e.g. People Tree, Marks and Spencer) and also fashion councils, such as British Fashion Council (www.**londonfashionweek**.co.uk) should be invited. The tours should also showcase the work of reputable designers who have established a brand name and USP for using heritage/culture in an innovative way. By making the buyers and design houses knowledgeable about sourcing craft skills from Tanzania, there may be a two-way flow between the international designers and Tanzania (e.g. the French couture house, Scherrer, took on the Indian designer, Ritu Beri for her use of traditional village textile crafts in very modern ready to wear and couture collections)
- For the large manufacturing centres, the problems are to develop products at a certain price, and they need to compete with the second-hand market in prices and emotion (as fashion is an emotional choice). Given that they have CAD facilities, there are opportunities to create networks and links with the handcraft sector and offer unique product design service to overseas buyers.

Objective 4: Relate design potential to the nature and flow of raw materials and their selection

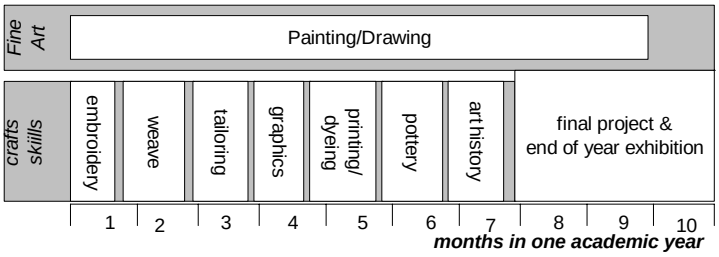
The selection of Tanzanian cotton appears to be one that primarily the handcraft sector aims for. The large manufacturers and fashion led companies do not tend to use it as first choice material (they all quote poor quality); they fulfil orders as requested by the industrial buyers. However, the consumer on the street, when purchasing clothing, has a definite preference for Tanzanian cotton when seeking to buy traditional kanga. In the immediate future, research seeking to understand the functional aspects of the locally produced cotton for traditional clothing may be useful.

D.4. Conclusion

The primary area of concern for the design and marketing of the Tanzanian textile and clothing industry is that there is very little design training and, in particular, methods of instilling creative thinking within product development. To develop design training in Tanzania, there would need to be several levels put into place: foundation and degree level (with the aim of developing towards postgraduate). Although there are no degree level courses available in textile and clothing, there are networks and colleges providing elements of courses that may be networked together to provide the fundamentals. The foundation level would be the most immediately attainable.

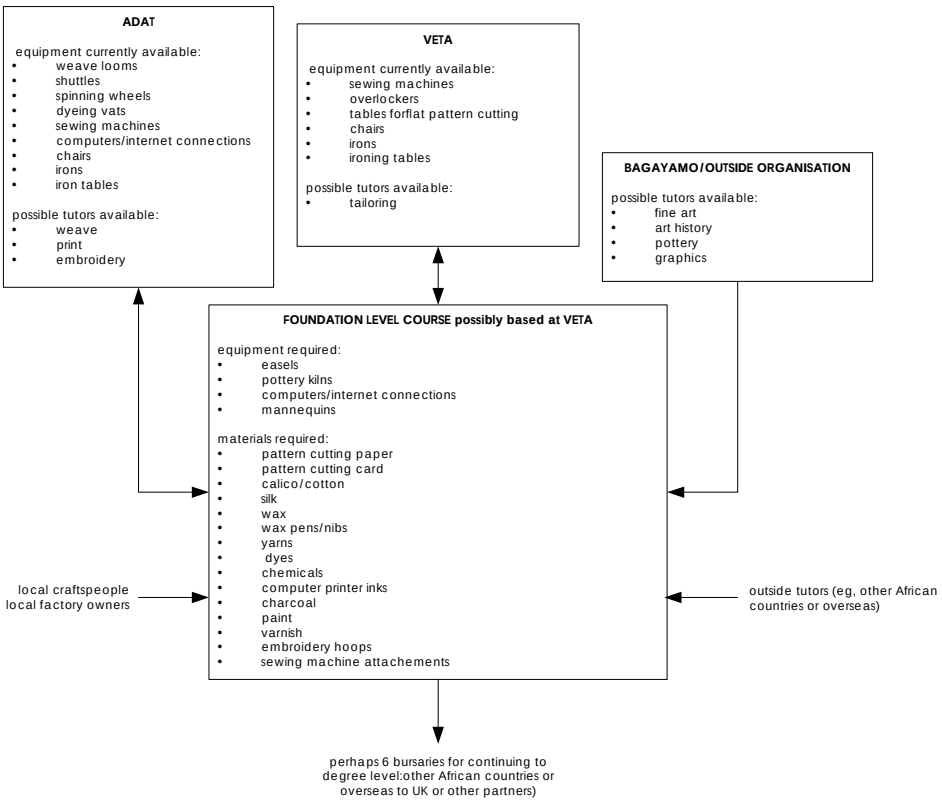
The VETA institution would appear to be the primary institution to turn to help develop foundation level courses in art and design (this would be post GCSE/O level and possibly directed at A level or post A level studies). The course would be a one-year program with the following elements: fine art and craft skills. The fine art elements would help to develop creative insight while the craft skills would help to further develop creative insight and also learn how to incorporate the creative insight into product development. VETA has networked with the UK through the Association of College Managers (Fair Trade In Skills, http://www.acm.uk.com/). The areas that are being focused on are: construction, agriculture and tourism, but there are also searches for opportunities with improving and updating of learning resources, and setting up teacher and student exchanges. Another college to network with may be the Bagamoyo College of Arts (http://www.sanaabagamoyo.com) where there is a tradition of teaching and practicing the fine arts. The crafts areas may be catered to through the input of associations such as ADAT (e.g. facilities such as weaving looms, sewing machinery, trainers).

Diagram 5: A possible structure for the foundation level



This approach would begin the process of developing networks between a number of handcraft sectors and educational institutes immediately. As there is also interest from international institutes (as demonstrated by the links between VETA and AMU in the UK), there is a possibility of developing international links, which would help in developing the design education and so raising creativity in the handcraft sector. Diagram 6 represents a possible networking approach to developing the foundation level course. Students may be moved between VETA and ADAT to make use of equipment, but spend the majority of their time at VETA premises. Institutes, such as Bagayamo, are far from Dar es Salaam and so it would be more practical to bring in tutors from there and buy equipment required to teach their classes. If networking were possible, then the immediate need to buy equipment as mentioned above would be reduced.

Diagram 6: a possible networking scenario for the foundation level course



A class of 20 could be divided into smaller classes of 10. Classes of 10 could then be rotated through a project area. As can be seen from Diagram 5, all would be attending the painting/drawing classes together. The following would be required: tutors, space, and equipment.

Tutors: from VETA, ADAT, Bagayamo or staff exchanges from international institutions. The tutors would need to be able to set briefs that would develop creativity and design skills and would also be able to advise on the final project (which a student would set for themselves). The tutor would need to be able to assess if the final project could be undertaken (appropriate mechanisms available) and that it would have appropriate outcomes.

Equipment*:*

- Weave: looms, yarns, shuttles,
- Painting: fabric, iron, table, wax, wax pens and nibs, dyeing vats, printing press, print blocks, dyes, chemicals
- Tailoring: sewing machines, over-lockers, chairs, paper, card, iron/iron table zips, buttons, thread, scissors, tables for flat working, interfacing, fusing, pins, chalk, fabric
- Embroidery: as for tailoring but with these extra items: embroidery hoops, sewing machine attachments for embroidery work, (embroidery machines), beading
- Pottery: kilns, clay, glazes
- Graphics: paper, computers, internet connections, pens, paint
- Art history: books, computers, internet connections
- Painting/drawing: easels, paper, charcoal, chalk, pens, paint, pencils, varnish

Costs for the Foundation level programme have been calculated on UK costs and presented in table 4. Equipment costs have been based on costs as experienced or through research on the internet.

Tutors pay:
The tutor's fees have been based on the average wages for a tutor at Further Education level: £4,000 per annum. This is an average salary, neither at the top end or bottom end. Tutors would not be needed for the entire year, see Diagram 5.

Student bursary:
£1,000 per annum.

Replenishable stock:
Items listed are not exhaustive; it is representative of the type of expenses that may be incurred; more or different items listed may be required. Network members may donate materials.

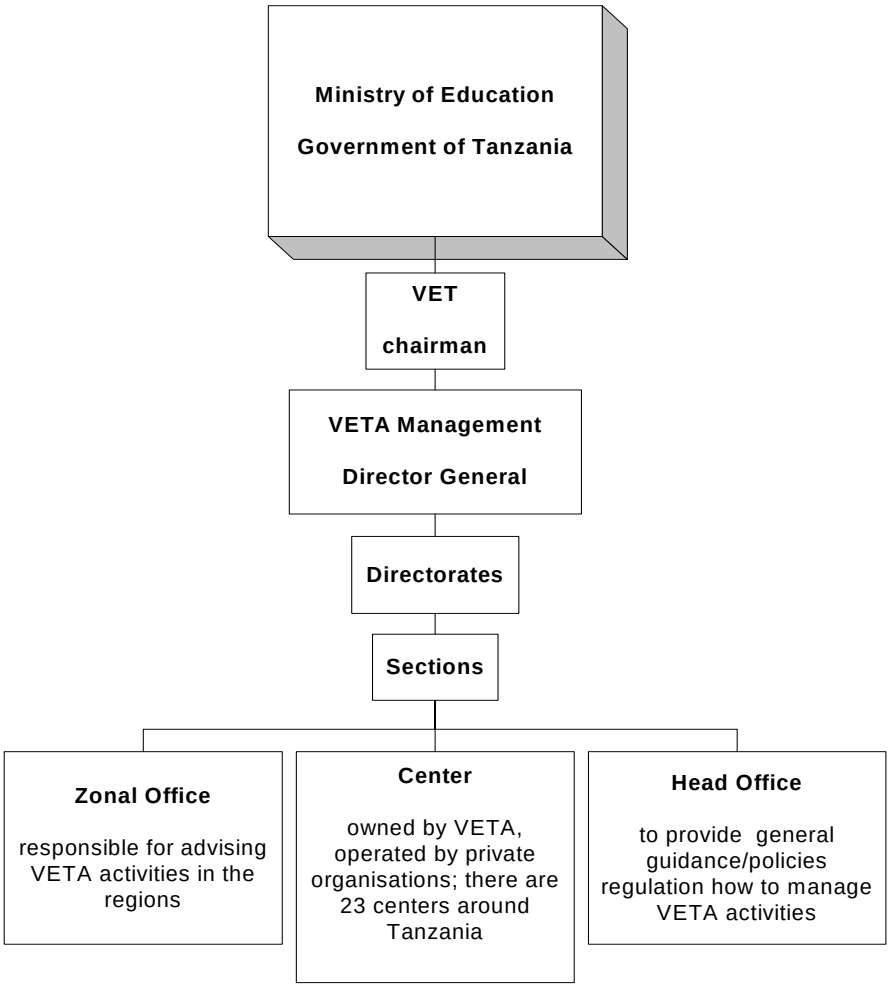
Equipment:
The equipment listed in the costings may not be needed to be bought immediately if network members allowed for the use for the foundation programme.

Table 4: Costs of foundation level course

ITEM	single unit (GB £)	amount	2008	subtotals 2008	2009	subtotals 2009	2010	2011	2012
TUTORS	400/mont								
VETA									
tailoring		5	24,000		24,000		24,000	24,000	24,000
ADAT							24,000	24,000	24,000
weave		5	24,000		24,000		24,000	24,000	24,000
print		5	24,000		24,000		24,000	24,000	24,000
embroidery		5	24,000		24,000		24,000	24,000	24,000
BAGAMOYO									
fine artist		9	43,200		43,200		43,200	43,200	43,200
art historian		1	4,800		4,800		4,800	4,800	4,800
pottery		1	4,800		4,800		4,800	4,800	4,800
graphics		1	4,800		4,800		4,800	4,800	4,800
subtotal		**32**		**153600**		**153600**			
EQUIPMENT									
Table Handweaving Looms	90	10	900						
wax heating tubs	40	5	200						
iron	30	2	60						
ironing table	30	2	60						
sewing machines	400	7	2800						
operator chairs	40	10	400						
overlockers	400	3	1200						
mannequins	250	5	1250						
pottery kiln	200	1	200						
pottery treadle wheel	300	2	600						
computers	300	10	3000						
painters easels	20	20	400						
studio tables	200	5	1000						
chairs for tables	40	20	800						
subtotal				**12870**		**12,870**			
yarns	5	40	200						
shuttles,	10	20	200						
fabric (calico, cotton, silk etc)	1.25/metre	250	250						
wax granules	5/500m	10	50						
wax pens and nibs	5	10	50						
print blocks	5	3	15						
pattern cutting paper,	60/roll	2	120						
pattern cutting card,	40/roll	2	80						
scissors,	5	20	100						
pins,	15	2	30						
tailors chalk,	15	2	30						
embroidery hoops,	3	10	30						
clay,	10/5kg	5	50						
glazes	10/500ml	10	100						
cartridge paper,	23	2	46						
Art books,	16	30	480						
subtotal				**1831**		**1831**			
STUDENT BURSARIES	1,000	20		**20,000**		**20,000**	20,000	20,000	20,000
TOTAL				**188301**		**167951**			

Appendix 1: VETA Vocational Education and Training Authority

VETA was established through the VETA Act No.1 in 1994 as an autonomous body. The highest board at VETA is the VET Board (Vocational and Educational Training). The organisation is structured in the following way:



The chairman of this board is an appointment of the Minister of Education and is appointed to the office by the President of Tanzania. Under the VET board is the VETA management and the CEO is the Director General. Within the sections there are three umbrellas of management: zonal, centre and head office. The centres are public companies and government partnerships: they are private establishments with government and VETA help.

There are 23 centres around the country and they all test applicants with the same questions. The centres are fee based: 110,000 Tsh per annum for classes or 150,000 Tsh for full board. These fees include all materials that will be required for the training. The fees are, of course, heavily subsidised. At private centres the fees would be much higher (about two times as much) and some missions also provide training for a much reduced fee of 6,000 Tsh, but the level of training is much lower.

There were two private training providers mentioned which offered tailoring training: Peramiho and NDANDA. VETA has good networks with the private training providers. VETA helped NDANDA curriculum development and carried out market assessments for them. They can carry out independent market research both within VETA for VETA or for outside clients to ascertain skills requirement for the market or conduct tracer studies on students to discover their experiences after their learning and what other help they may need. This data is used to validate the training provided.

The level at which VETA awards its certificates are at levels 1-3, this is craft level and provides for artisan level. Tertiary level awards are at 4, 5 and 6 (National Accreditation and Technical Education) while universities award at levels 7, 8 and 9. Students enrolling on the tailoring courses are usually primary level educated and so their horizons are often limited. At this level, students may consider enrolling into classes either from tailoring or masonry/bricklaying. When applying to the centre, all potential students have to be tested. The selection test is an aptitude test in maths and English (which also tests creativity). There are normally around 3,000 applications for about 1,500 places. The pass level is 70%. Of the 1,500 places, there are courses in mechanical, electrical, IT and secretarial studies; these are the most popular courses. There are usually about 1,000 applications for motor mechanics for 82 places.

40% of the applications are for tailoring, the centre at Dar es Salaam has a capacity of 20x2 places (am and pm classes). Tailoring is increasing in demand; there is an increasing demand to copy more expensive items, it's easy to set up a business or get employment with tailoring skills and the number of people with standard 7 education is also increasing. Most of the trainees and workforce in the factories are women.

Industry experts are brought in to help develop the curriculum. The tailoring course at VETA had previously been a traditional course, but in 1989 there was a curriculum review where it was decided that the course would no longer be a six month course but rather a one year course, six months would be practical training at a factory and a six month period at VETA. The content of the programme includes design as part of the study, but it is not taught explicitly. There are few competent experts that can teach design. The programme is due for a review again and it is recognised that there has been a change in technologies but, again, skills are few in this area. There are 60 tailoring courses in Dar es Salaam alone, but no higher level education in this area in Tanzania. Higher education level of training in fashion and design are in Kenya (Advanced Diploma) or degree in Zimbabwe (degree level), but this is looking very precarious due to the political unrest.

Fashion designers are respected if they reach a high level, examples of fashion designers who are famous and respected are: Africasana who can charge up to 70,000-80,000 Tsh (very expensive). The public are eager to have new fashions, but people to make them aren't here. Associations that may be able to help with discovering the number of designers or handcrafters are CTI (Chamber of Trade and Industry) - many of the big designers are members - SIDO (medium-small designers' names help them financially and with training skills needs) and also UNIDO (as SIDO).

Appendix 2: COET

University of Dar Es Salaam
The College of Engineering and Technology (COET)
PO Box 357075
Dar Es Salaam
Tanzania
Tel +255 22 2410376

There are 15 undergraduate degree programmes (six of which are in mechanical engineering).

The college has recently undertaken a curriculum review. Through the innovation clusters, there are eight pilot clusters being developed, one of these is in Dar es Salaam and is a textile cluster initiative. The college is in the final stages of launching this initiative.

With regard to the postgraduate programmes, 17 have been approved by the senate and these run when there are enough students. A number of them are continuous; e.g. water resources, engineering management. There are about 50+ students on the Masters in mechanical course. There are research projects being conducted in engineering materials (bio-composites). There are two projects (EU and European University) collaboration.

It was discovered that Tanzania had established about 14 textile mills by 1995. Most of these were government/national mills. There were a few privately owned mills, these numbered about five and were scattered around Arusha and Dar es Salaam. By the late 1990s, those mills had more or less completely collapsed. Some mills were bought and operated privately, such as Urafiki, Karibu (was private before) and Msoma. The overall situation is bad but as a field of study, the skills are still present in the country. Most of the mills that were operating were textile cotton processing mills, blending polyester, cotton and viscose. Again, Arusha is still operating.

In the past the workforce would be trained up to university level often from the UK (e.g. Bolton, Leeds and Manchester). Due to the collapse of the industry, many of these people are no longer employed. With regards to training, the government had plans to develop a textiles training institute, but this had dried up. They had also undergone a process of starting up textile engineering programmes, but this too never took off. There is the equipment to start up chemical processing. With regards to design and production, physics and botany can be used to develop and support the programmes. Five years ago, there had been a textile and clothing programme at Soko University.

The round table discussion also offered many suggestions for the demise of the textiles industry:

Investment – funds from the World Bank were available to start up the mill but needs to have operating funds and there were not enough facilities to do this.

Cotton is grown here but can't be brought through local market and so it becomes very expensive.

The Tanzanian economy is not a manufacturing economy but rather a processing one with dealers in China and Japan. Spare parts cannot be obtained for the mills as they're too expensive, so the mills get run down. Many of the mills were vertically integrated - the current thinking is to have horizontal integration; spinning to dyeing, in this process spinning would take place at one mill and dyeing at another. For this approach to work, it requires collaboration. TIRO (Tanzanian Industrial Research Organisation) trained textile engineers but diversified to composting and chemistry labs. Diversification of products to synthetic fibres was also in place, during the 1970s and 1980s; the development of nylon overwhelmed the cotton industry. But now that there is more emphasis on natural fibres again, the trend is reversing and the synthetics market is now affected.

Textile technology is not new to COET, an MEng has been approved by the senate but the industry collapsed and experts from TISCO, an Indian company, were brought in to inform the organisation. In 1992, after a review, the programme was withdrawn due to lack of demand; it could be reviewed for an undergraduate programmes. With more support, units could be set up to absorb graduates.

With regards to design, there are dyeing, fabric construction and fine art areas in the university. There is also a design and production engineering programme, but this is concerned more with packaging and paper, etc but not textiles. Textiles and fibres are regarded as materials, the research activities are in fibres (naturals) and structures (such as sisal, coya, kapak, and kapak/cotton mixes). There was a proposition that if volume of home production of clothing manufacture could be increased then it might lessen the impact of the second-hand clothes market. The government, in a bid to reduce the amount of importation of second-hand goods, tried to introduce taxes to levy on this but the reasons why people buy second-hand far outweighed any increase in prices. The second-hand clothes were often of better quality and lower priced then locally produced goods.

Morogoro polyester/cotton blends were able to penetrate the American market. The MFA led the Americans to come to Tanzania for cotton and quality was not an issue for them then. With the lack of the MFA, this has increased competition. Lonhro (an American firm) bought cotton from Tanzania, processed it outside and then reintroduced it into the Tanzanian market at a higher price. India and China have managed to organise some form of home protection markets. Regarding labour costs, the average Tanzanian earns about 40 cents an hour and this is Tanzania's competitive advantage. There were also some designers (trained in the UK), but it was not known where they were now.

With regards to re-establishing textiles teaching and research in the university, it was estimated that of the 130 academic staff, some 85 have PhD's (from 14 different countries) and some of these are in textile related areas. However, the university has to respond to society's needs and demands. The example given was that of mining. There had previously been no mining training in the country until 2000. Once the decision was taken to train graduates in mining, they, as a university, dealt with this as a problem and they are now coming to the third year of graduates in mining.

The textiles industry is being addressed in the form of a textile cluster. Existing clusters of textile groups have been identified and their training needs have been highlighted. A group of experts have put together a realistic action plan to launch this innovation cluster and they have started to actively work together. Entrepreneurs collaborate with a view to getting maximum benefit - one member of

this cluster is a design and fashion handcraft business. The cluster has been reviewed and is ready to take off - SIDO will be financing it prior to launch.

The University had conducted a survey on SME activity in Tanzania and found that the handcrafts could be categorised for popularity: woodworking was the most popular handcraft sector for SME, then metalworking and third was textiles. Most of the textiles SME's were in tailoring, gowns and hand weaving (kikoi). The companies buy grey cloth from factories and turn them into garments, who were mostly women. The university explained about the funding that had been taking place for the handcraft sector. Ten years ago, there had been funding from Sweden and Denmark volunteer services. Tabora was a handloom production. In 1991, Morogoro and Arusha were centres of handloom weaving and dyeing. UNIDO also funded textile entrepreneurship for women. Three years later, this collapsed as the handloom weaving, tie and dye market was reduced due to lack of fashion demand.

Appendix 3: ADAT
ADAT: Artisan Development Agency of Tanzania

This is an organisation with origins in an UNIDO project from 1995 'Tanzania Business Women Textile Project', which towards the end of the project in 1996 formed an NGO – ADAT.

The aim of ADAT is to train entrepreneurship and technical skills towards capacity building in textile products. ADAT has about 100 members on their books.

10,000 Tsh annual charge
2000 Tsh a month (going up to 5000 Tsh)

ADAT has recently reviewed its strategies at their AGM and organised itself into committees to oversee the following:

- Marketing
- Production
- Importation of raw materials five members each and this move has been prompted by a meeting with SIDO and the government; the government have appointed SIDO to work with them to export. One of the members has an AGOA order, but cannot take it up as they don't have the production capacities; the idea is to develop a network to do so.

ADAT originally ran three short courses in:

- Surface finishing (tie and dye, printing)
- Sewing machine maintenance and stitching (tailoring and sewing)
- Marketing and entrepreneurship (business management aspects)

A fourth was added in hand weaving in 2001. They began with 12 trainees who are currently manufacturing and selling in regional trade fairs (trade fairs and selling shows in the East African region). All four of the programmes have become saturated in terms of customers; hand weaving attracted many as the competition from low priced industry manufactured fabric became intense (competition from Pakistan) and so lowered demand for hand woven fabric. The training programmes are in knowledge and skills and used to be six months long but are now four months. More bespoke courses to be organised in upgrading, product development is an ongoing process. The Ministry of Gender and Children helped ADAT to organise the training courses. However, it was noted that it was not only access to training that would make a project successful, raw materials, machinery and space issues were also important.

The kikoi (hand woven fabric) uses home produced and finished cotton yarn. Imported synthetic yarns are also used as are dyes. As an NGO they are exempt for the normal taxation on the raw materials and so ADAT can sell them on to their members at a reduced price compared to the marketplace.

- The dyes are bought direct form the importers.
- Yarn is bought from a company called Muhammed Enterprises in Tanga; yarns from Tanga are better quality than from Tabora as they absorb dyes better and are stronger.

- Chemicals are bought from agents. They used to buy from HR and sons but now buy from Tata African Holding Company as they have better quality caustic soda.

Yarn produced locally is very expensive and so ADAT is looking for cheaper imports to make the products less expensive to develop. Members buy from ADAT the raw materials to either sell or add value to their own products. Typical prices for finished articles are:

Scarf Wholesale – 3,000 Tsh per piece (there are 10 pieces in the wholesale pack)
Retail - 3,500 Tsh (@$3)
Kikoi (2mx115-110 cm): wholesale – 6,500 Tsh
: retail - 7,500 Tsh

ADAT products are sold at their premises and also the National Museum.

ADAT has user facilities where members may hire and pay for the equipment, such as handlooms and computers to access the Internet and the fees are discussed according to need. There are problems associated with this too:

- Rents are very high, necessitating high hire charges
- The space is not suitable either: the recycling of dyes and chemicals requires extra space to get rid of this. The area is very dusty and this is not suitable for working with textiles. The weaving machines are big and bulky and difficult to transport and take up a lot of space.
- Lack of research facilities: in 1987-8 there was a move towards using natural dyes but there were not enough funds to research and make the natural dyes of a comparable quality to the synthetic dyes. The weavers who use ADAT don't have the skills to look and research as they have had no exposure to other weavers; the weave structures for hand woven's are plain and more input is needed to develop patterns and differentiate the products. This lack of research ability limits the products.
- Although the members have access to the internet, they do not conduct market research, they rely on that done by members who are prepared to talk about and share their experiences of exhibitions they have attended. There are plans to have a CBI programme on Export Marketing.

ADAT have a connection with TGT who promotes them and they have also helped financially in capacity building for their members (who are their beneficiaries). TGT have given ADAT grants to help them organise workshops training in: screen printing, e-marketing, standardisation, environmentally friendly dyeing.

ANNEX E

International market access and prospects

TABLE OF CONTENTS

This annex describes market access for Tanzania's cotton and textile exporters, both in the region and internationally. It also describes current trends in the global market for cotton and goes on to discuss the prospects for niche two cotton markets, namely Fairtrade and organic.

E.1 Regional market access

The two most important regional trade agreements (RTAs) for Tanzania take place under the East African Community (EAC) and the Southern Africa Development Community (SADC).

E.1.1 EAC[1]

The original signatories of the EAC are Tanzania, Uganda and Kenya. Rwanda and Burundi are also due to join the EAC on 1 July 2007. The (current) Treaty for the Establishment of the East African Community (EAC) was signed on 30 November 1999, and entered into force on 7 July 2000. Under the Protocol, the customs union is to be established progressively over five years from the entry into force of the Protocol (1 January 2005). The EAC Common External Tariff (CET), adopted as from 2005, has three bands (0%, 10%, and 25%), although rates above 25% apply to a number of "sensitive" products. Relevant to this study, sensitive products include Khanga, Kikoi and Kitenge fabrics, second hand clothing, cotton bed linen and cotton label linen. The CET for cotton and cotton-based textiles products is shown in table E.1.

Table E.1 EAC CET for cotton and cotton-based textiles

Product description	CET (%)
Raw Cotton	0
Cotton sewing thread	25
Cotton yarn	10
Woven fabrics	25
Knitted or crocheted fabrics	25
Clothing	25
Other textiles	25
Second hand clothing	45% or US$0.3/kg whichever is higher
Khanga, Kikoi & Kitenge	50
Cotton bed linen	50
Cotton table linen, other than knitted or crocheted	50
Toilet linen and kitchen linen of terry towelling	50

Source: Annex 1 to the EAC Customs Union Protocol.

The free-trade area component of the EAC customs union is yet to be established. Trade in goods between Tanzania and Uganda, as well as imports from Tanzania and Uganda to Kenya, have been duty free since 1 January 2005, while goods from

[1] This section is drawn from World Trade Organisation (2006).

Kenya to Tanzania and Uganda are under either Category A (for immediate duty-free treatment) or Category B (gradual tariff reduction).

Goods are defined as originating in the country where they are wholly produced or undergo substantial transformation. The criterion of substantial transformation is satisfied if the imported content of the goods is no more than 60% of the c.i.f. value of the cost of materials used in their production, and the value-added resulting from the production process (that should lead to a change in tariff heading) accounts for at least 35% of the ex-factory cost of the goods. In order to qualify as originating in the region, goods must be consigned directly from a member state. The Annex also provides for a model certificate of origin.

E.1.2 SADC[2]

The SADC Treaty was signed in 1992 with the objective of creating a development community that would achieve economic integration, including trade. SADC has 14 members.[3] The Trade Protocol, signed in 1996, is aimed at progressively establishing a SADC free-trade area, initially over eight years. However, progress has been slow. The Protocol was implemented in September 2000 after ratification by 11 members.[4] Under this protocol, it is intended that by 2010, about 98% of intra-SADC merchandise trade will be duty-free.

Differences in labour intensity at various stages in the textile and garment value chain mean that there are potentially significant complementarities among SADC member states which, through SADC trade initiatives, might enhance the region's competitiveness in world markets. It is a sector in which some of the member states, most importantly Mauritius, have already demonstrated the potential of the region to promote growth and poverty reduction through international exports. And the opportunities opened up through AGOA make this a crucial time for remedying domestic and regional policy weaknesses that have hindered the region's international competitiveness.

With a few exceptions and except for yarn, SADC rules of origin require double transformation in order to qualify for SADC tariff preferences – garments must be made from regionally produced textiles; fabric must be made from regionally produced yarns; yarn must be made from uncarded, uncombed fibre or from chemical products.

However Tanzania has been provided with preferential trade access for clothing and textiles to the Southern African Customs Union (SACU) region under relaxed rules of origin. Apart from Tanzania, other SADC members that receive this preferential trade opportunity include Malawi, Mozambique and Zambia. Under this agreement, Tanzania can now access the market under a one stage transformation rule subject to quotas. The quotas are based on current production and the agreement is valid for five years. The agreement is ad hoc and temporary, pending the creation of a SADC free trade area in 2008.

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[2] This section is largely drawn from World Bank (2005).

[3] Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, the Seychelles, Tanzania, South Africa, Swaziland, Zambia, and Zimbabwe.

[4] By September 2000, Angola, the Democratic Republic of Congo, and the Seychelles had not ratified the Protocol.

E.1.3 Overlapping Membership in Regional Agreements[5]

The simultaneous participation in several RTAs poses a number of challenges for trade policy makers in Tanzania and in its EAC partners. Tanzania is a member of SADC, but not of COMESA, while Kenya and Uganda are members of COMESA, but not of SADC. This asymmetric configuration has the potential to create confusing and conflicting situations, which are bound to intensify over time as the respective integration agendas of EAC, SADC and COMESA deepen.

Multiple membership of overlapping RTAs creates demanding requirements. Traders have to operate within different trade regimes, each with its own tariff rates, regulations and procedures. In the public sector, negotiating and serving different regional initiatives can absorb large amounts of scarce administrative resources and occupy policymakers' attention to a considerable extent. One issue of particular concern is the potentially significant costs that can result from the need to comply with multiple rules of origin regulations. This situation can pose problems for firms in EAC members as they may need to adjust their production or trade operations depending on which country they are exporting to. The most likely outcome is that firms would be compelled to focus on only certain export destinations. Also, situations at the border may arise that are open to abuse or subject to excessive bureaucracy, thereby inflicting costs on traders in addition and beyond those related to compliance with the applicable rules of origin regulations.

Another type of problem from overlapping RTA-membership relates to conflicting liberalisation commitments and requirements in different agreements. As a result of this, as long as the situation of overlapping membership remains, the EAC will not be able to become a fully functioning customs union, and its members will not be able to reap the benefits of free internal movement of goods. Both COMESA and SADC are also hoping to form customs unions in the medium-term future. Since one country can not realistically apply two different common external tariffs, Tanzania and its EAC partners are sooner or later bound to face the choice about which agreement they want to go with.

E.2 International market access

Most of Tanzania's current exports face no customs duties, mostly because of either zero or low MFN rates set by the importing countries on these products or because Tanzanian exporters take advantage of preferential access such as under the Generalized System of Preferences (GSP) (World Bank, 2005). However, Tanzanian exporters face important tariff barriers for cotton and for textiles.

For example, in addition to levying an import duty of 47% on cotton, China also shields its domestic growers with subsidies and other measures totalling $1.2 billion in 2002, second to the US with $3.6 billion, and above the EU ($1.1 billion) and India ($500 million).[6] Despite these barriers, Tanzania still exports considerable quantities of cotton to China – in 2004/05, it was Tanzania's most important export market.

[5] This section is drawn from World Bank (2005).

[6] See John Baffes, "Cotton: Market Setting, Trade Policies, and Issues," in Global Agricultural Trade and Developing Countries edited by M. Ataman Aksoy and John C. Beghin (Washington: The World Bank, 2005), pp. 259-273.

As shown in table E.2, textiles and clothing products also face considerable tariff barriers to various markets, which are most pronounced for exports to India. Even where preferences are available and Tanzania currently exports the product, traders do not necessarily receive tariff preferences on every shipment (e.g. for t-shirts in the US). Non-preferential tariffs for exports to the US for fabric and garments range between 20 and 30%.

Table E.2. MFN tariffs and Tanzania's exports of textiles and clothing, 2003

Region or Country	Product	Simple Average Tariff (%)	Weighted Average Tariff (%)	Value of Exports ($000)	Share of Total Exports
World	All Products	9.8	4.8	1,017,182	
	Textiles and Clothing	15.2	11.4	13,967	
EU	All Products to EU	4.9	3.2	689,634	67.8%
	Textiles and Clothing	8.7	10.4	4,528	0.4%
Japan	All Products to Japan	2.4	0.3	99,826	9.8%
	Textiles and Clothing	4.8	0.8	1,571	0.2%
US	All Products to U.S.	3.4	2.7	25,386	2.5%
	Textiles and Clothing	8.6	11.4	2,063	0.2%
COMESA	All Products to COMESA	13.5	12.3	76,877	7.6%
	Textiles and Clothing	18.0	17.0	2,896	0.3%
SADC	All Products to SADC	17.3	13.4	17,502	1.7%
	Textiles and Clothing	22.5	22.7	1,267	0.1%
India	All Products to India	31.5	32.0	76,729	7.5%
	Textiles and Clothing	27.5	22.0	14	0.0%
China	All Products to China	7.9	11.8	27,567	2.7%
	Textiles and Clothing	6.0	6.0	96	0.0%

Source: World Bank (2005)

Notes:
- "World" includes only 2003 data.
- The most recent Indian tariff and trade data come from 2001
- Tariffs on non-traded products are excluded
- SADC and COMESA include all members, including countries that are in both (for example, Zambia) regardless of participation in trade liberalisation protocols.
- All export values are based on mirror statistics, that is, reports by the importing countries.

Although Tanzania is eligible for various non-reciprocal trade preferences from developed countries, their use remains limited. Recent studies have attributed the under-performance of such preferential trade arrangement schemes to a host of external factors. They are observed to exclude, or include on a limited basis, products in which developing countries have the greatest comparative advantages, including agricultural goods and textiles and clothing. Burdensome rules of origin often serve as a deterrent to countries with limited technological capacity. In addition, these preferences may be considered uncertain because they can be revoked or modified unilaterally. Uncertainty is increased by the inclusion of various non-trade (political, labour, social, and environmental) concerns as conditions for accessing all or certain aspects of the available preferences. Furthermore, even

without these constraints, liberalisation of preferential markets (including through the increasing number of regional trade agreements) continues to erode existing preferences (World Bank 2006).

E.2.1 Market access to the European Union

Under the Cotonou agreement, Tanzania benefits from non-reciprocal trade preferences during an interim period (2001-07). At the end of the interim period (31 December 2007 at the latest), these unilateral preferences will be replaced by WTO-compatible reciprocal economic partnership agreements (EPAs) between the EC and groups of ACP countries.

Kenya and Uganda are currently participating in the EPA negotiations as members of the Eastern and Southern Africa (ESA) region while Tanzania is participating under SADC. However the EAC formally announced on 13 April 2007 that they intend to negotiate an EPA as a separate block. If this proposal is accepted, it would mean that Tanzania must withdraw from the SADC EPA configuration. However it remains to be seen if the EAC countries will withdraw from their current configurations and if the EC will accept this proposal at such a late stage.

Tanzania is also a beneficiary of the EU's 'Everything But Arms' agreement under which duty- and quota-free access is provided for all products originating in the LDCs, except for arms and ammunition (with a transitional period for fresh bananas, rice, and sugar). However, exports to the EU under EBA are subject to rules of origin. While products wholly obtained in the exporting country are considered as originating there, products manufactured with inputs from other countries are considered so only if they have undergone sufficient working or processing.

These rules of origin particularly negate the generosity of the EU preferences provided for textiles and clothing. The preference utilisation rate for developing countries exporting these products to the EU is just 31% (Brenton & Manchin, 2002). This is because EU rules of origin in the clothing sector stipulate a double step processing requirement whereby clothing products must be made from domestically produced fabrics or fabric from EU countries. Clothing produced from fabric imported from third countries will not satisfy the EU rules of origin and will not receive preferential treatment.

The potential role that preferential market access to the EU for textiles and clothing can play in a country's development is demonstrated by the case of Mauritius (see Box E.1). However, the EU's existing rules of origin mean that it would not be possible for Mauritius to do this again. There is a possibility that these stringent rules of origin could be relaxed under a future EPA agreement. Although highly technical in nature, this is therefore a key issue for Tanzania in the negotiations – it is one of the main ways in which an EPA could result in an improvement in Tanzania's access to EU markets.

Box E.1 The development of the clothing industry in Mauritius

One of the major reasons for Mauritius's economic development over the past few decades has been the fact that by taking advantage of the EU's Lomé Provisions. These allowed the use of inputs from third countries in manufacturing goods destined for the EU market, provided that the processes complied with the EUR1 rules of origin. Inputs in this sector were mainly sourced from Asia and the finished products were meant for Europe and the US.

The Mauritian clothing industry first grew to a significant size in the mid- and late-1980s, with employment increasing from less than 20,000 (1982) to 77,000 (1988). Investment was mainly from Hong Kong-based companies who were interested in cheap labour and having access to quota-free and subsequently, quota allocations - for the US (and to a lesser extent the EU) market. 65% of all equity of clothing sector enterprises set up in Mauritius during the period 1983-85 was Hong Kong owned. From 1984 onwards, changes in US Rules of Origin legislation led to a further outflow of Chinese capital from Hong Kong, some of which was attracted to Mauritius.

Both in the late 1980s and subsequently, the great bulk of Mauritian exports for the US market were manufactured by plants of Hong Kong, Singaporean and Taiwanese groups on the basis of cut, make and trim (CMT). Two large groups, Esquel and Novel established a presence on the island.

During most of the 80s, Far East Asian-owned plants were the most important source of exports for the EU market. However in the late 1980s, there was a steady increase in the proportion of exports from locally-owned enterprises, some of which started to integrate backwards into wool spinning, fabric knitting, dyeing, etc, in order to take advantage of the Lomé Convention. However, the rapid expansion of local small-scale CMT enterprises also led to a decline in productivity. During the 1990s, the level of backward integration increased further, hence reducing the imported content in Mauritian exports.

By the end of the 90's, however, the textile and clothing sector went into a decline with a gradual decrease in growth and exports, closures of enterprises and loss of employment. More recently the phasing out of the Multifibre agreement in December 2004 as well as the end of preferential agreements with the EU is creating greater opportunities for competitors such as China, India and Pakistan to take over a large share of the Mauritian export markets. Increasing labour costs, utility costs and freight costs relative to Asian competitors have contributed to eroding cost-competitiveness. The high interest rates and the appreciating Mauritian rupee have also not favoured the sector.

Source: RATES (2005)

E.2.2 Market access to the US

Tanzania qualified for the African Growth and Opportunity Act (AGOA) in February 2002. However AGOA eligibility does not automatically imply eligibility for the "wearing apparel" provisions, which allow countries to export wearing apparel to the US market duty and quota free; these are governed by a separate set of conditions and associated rules of origin. To export apparel (and certain textile items) to the US duty-free under the AGOA, countries must implement a "visa system" that ensures compliance with the required rules of origin. Kenya, Tanzania, and Uganda were declared eligible for the preferences under the apparel provisions in July 2004. The typical US MFN import duties on garments currently exported from the SADC region are in the range of 17-20%, so these provide significant preferential access.

A special rule allows AGOA-eligible countries that are deemed to be 'Lesser Developed Countries' (including Tanzania) to utilise non-qualifying third country input materials for eligible apparel exports. All AGOA-eligible countries, with the exception of South Africa, Mauritius, Gabon and the Seychelles currently enjoy 'Lesser Developed Country' status, and will continue to do so, at least until 2012.

The more relaxed rule of origin currently available under AGOA, relative to those provided by the EU under EBA are probably the main explanation for why the US is a more important export market than the EU for Tanzanian apparel exporters. The potential of AGOA to kick start the textiles industry in African countries is demonstrated by the case of Lesotho (see Box E.2 below).

Box E.2 The development of the clothing industry in Lesotho

The garment and clothing industry in Lesotho has evolved from a nascent artisan industry in the late 1980s to a major source of export earnings. Starting in the late 1980s and gaining momentum with the duty and quota-free access to the EU. market provided under the AGOA, the industry attracted significant levels of FDI, primarily from East Asia. East Asians own most clothing factories, employing around 32,000 people. Of the 38 clothing factories, 25 are from Taiwan, Province of China, and another four have headquarters in Hong Kong, China, or Singapore. Most sell their output to and procure their inputs from East Asian 'full package' suppliers to the U.S. market.

With garment exports jumping from about US$100 million in 1998 to about US$450 million in 2004, corresponding to an average annual growth rate of more than 50%, the sector has been the main source of growth in Lesotho over recent years. The expansion in the sector has led to tremendous job creation, with the primary beneficiaries being the urban poor and mostly women.

This expansion of exports to the US, almost exclusively of clothing, can be attributed to Taiwanese firms that have invested in the country to serve the US market. Lesotho's garment exports previously received preferential treatment in the U.S. market as a consequence of the Multi Fibre Agreement (MFA), although this expired in 2005. Preferential treatment was subsequently provided under AGOA.

The development of Lesotho's garment industry therefore results in part from temporary, nonreciprocal trade preferences. The Lesotho garment industry fits into a supply chain in which massive orders from US brands, importers and retailers are awarded to multinational companies, often with their head offices in Asia. These companies break down the bulk orders into sub-orders that they place with their affiliates around the world to take advantage of their relative areas of competitiveness, including market access terms.

In this system competition for a sub-contract is almost exclusively on the basis of price. Lesotho is concerned solely with what is called 'cut, make and trim' (CMT): all of the inputs are supplied by the parent company; none is bought locally. Consequently the industry is vulnerable to changes in the external market. Its clothing does not meet the Cotonou origin rules and nor will it meet the AGOA rules of origin after the expiry of a derogation that allows 'lesser developed countries' to use Far Eastern cloth.

There have been few backward linkages from manufacturing FDI in Lesotho, apart from non-tradeables like labour and utilities. The lack of natural resources may be one explanation as downstream processing activities that could deploy advanced technologies, cannot be attracted or promoted. Assembly operations have not triggered the kinds of local business activity that could service them. For instance in the clothing industry all the fabrics and accessories are imported, largely from Asia. Even the simplest inputs, such as packaging, are largely imported, though there are plans to develop them locally and regionally.

However, much of this is due to a very small value added in Lesotho, with much of the inputs being imported. As a result, the linkages between the garment sector and SMEs or other large-scale industries are limited.

E.2.3 The importance of rules of origin

The current rules of origin (in SADC and the EU), requiring double transformation in order to qualify for preferences place constraints on the ability of Tanzanian textiles and clothing manufacturers to link with other producers in the region and elsewhere in the world. To take advantage of international export opportunities, producers at any place in the value chain would benefit from as much flexibility as possible in sourcing raw materials and intermediate inputs. Thus the stringent rules of origin hinder rather than promote regional vertical integration.

E.3 The global cotton market

E.3.1 World production, trade and prices

The Northern Hemisphere accounts for about 90% of global cotton output (see table E.3). China and the United States each account for about 20%, followed by India (12%), Pakistan (8%), and Uzbekistan (5%). Other significant cotton producers are the countries of Francophone Africa, Turkey, Brazil, Australia, and Greece, which together account for 18% of global output. Tanzania accounts for around 0.5% of world cotton production and 6-7% of African production.

One third of cotton production is traded internationally. The four dominant exporters — US, Francophone Africa, Uzbekistan, and Australia — account for more than two-thirds of exports. Three major producers — India, Pakistan, and Turkey — export no cotton and occasionally import it to supply domestic textile industries. Imports of cotton are more uniformly distributed than exports. During the 2000/01 season the eight largest importers—Indonesia, India, Mexico, Thailand, Turkey, Russia, Italy, and the Republic of Korea—accounted for over half of world imports. Cotton exports and imports have gradually become less concentrated.

During the 1990s world cotton prices fluctuated between US$2.53/kg (May 1995) and US$0.97/kg (December 1999). Several factors contributed to the decline in prices after 1996. There was excess production during the 1997/98 season, and demand was weak, especially from the East Asian textile producers affected by the financial crisis of 1997 — Indonesia, Republic of Korea, and Thailand — which account for more than 15% of cotton import demand. Stocks rose to a record 9.8 million tons in 1997/98, pushing the stocks-to-use ratio to 0.51, its highest level since 1985/86. Currency devaluations in several East Asian chemical fibre producers also lowered the prices of competing synthetic fibres, further depressing demand for cotton.

Table E.3 Global balance of the cotton market ('000 tonnes), 1960-2002

	1960	1970	1980	1990	1998	1999	2000	2001	2002
PRODUCTION									
US	3,147	2,219	2,422	3,376	3,030	3,835	3,818	4,393	4,436
China	1,372	1,995	2,707	4,508	4,501	3,830	4,350	5,100	3,825
India	1,012	909	1,322	1,989	2,710	2,650	2,350	2,459	2,377
Pakistan	306	543	714	1,638	1,480	1,800	1,750	1,743	1,683
Uzbekistan	1,491	2,342	2,661	2,593	1,000	1,150	960	1,055	991
Franc Zone	63	140	224	562	897	928	700	991	972
Turkey	192	400	500	655	871	826	740	900	917
Brazil	425	549	623	717	420	648	848	725	798
Australia	2	19	99	433	726	733	704	658	542
Greece	63	110	115	213	405	428	420	410	341
Egypt	480	509	529	296	230	229	206	279	264
World	10,201	11,740	13,831	18,970	18,551	18,887	18,901	20,856	19,076
EXPORTS									
US	1,444	848	1,290	1,697	915	1,481	1,470	2,134	2,056
Franc Zone	48	137	185	498	843	769	704	804	985
Uzbekistan	381	553	616	397	900	900	820	718	717
Australia	0	4	53	329	650	710	720	650	609
Greece	33	0	13	86	230	294	293	257	249
Syria	97	134	71	91	210	180	245	220	171
World	3,667	3,875	4,414	5,081	5,274	6,054	5,875	6,167	6,256
IMPORTS									
Indonesia	7	36	106	324	500	455	520	559	537
India	204	155	0	0	136	200	340	425	509
Mexico	0	1	0	43	302	436	473	396	352
Thailand	4	46	86	354	271	302	360	387	356
Turkey	0	1	0	46	250	459	285	385	358
Russia	0	238	28	37	179	284	325	341	338
Italy	218	178	193	336	330	365	310	323	315
Korea, Rep.	51	121	332	447	330	350	315	318	298
Japan	800	796	697	634	270	276	242	247	240
Taiwan (China)	47	160	214	358	293	322	269	225	214
World	3,804	4,086	4,555	5,222	5,429	5,811	5,875	6,167	6,256

Source: ICAC, Cotton: Review of the World Situation, various issues.

E.3.2. Market distortions

Cotton is subject to numerous marketing and trade interventions. For eight countries (United States, China, European Union, Turkey, Brazil, Mexico, and Egypt), direct production assistance in the five seasons between 1997/98 and 2001/02 ranged from US$3.8 to US$5.3 billion. In 2001/02 direct assistance to cotton producers reached US$2.3 billion in the United States, US$1.2 billion in China, and US$0.8 billion in the European Union (Greece and Spain). India was also a big cotton supporter that season, providing an estimated US$0.5 billion to producers. Producers in Turkey, Brazil, Mexico, and Egypt received a combined total of US$150 million in support.

Many studies have attempted to measure the impact of cotton subsidies on world cotton prices and production. Studies predict that a removal of support subsidies would result in an increase in the world price of cotton of 11-28%. These studies suggest that cotton export earnings could increase for all developing countries by US$610 million to US$3,250 million. West and Central African countries could gain between US$94 million and US$360 million in cotton production earnings (from an initial level of US$963 million) (FAO undated).

In 2003, Brazil was the first country to make a formal complaint under the WTO dispute mechanism about US cotton subsidies, contending that these depressed world prices and were injurious to Brazilian cotton growers, while significantly increasing the US share of the global cotton market. In September 2004, a WTO panel ruled that US cotton subsidies were in violation of WTO rules on agriculture and subsidies. The WTO panel ordered the US to immediately withdraw the subsidies it had found to be prohibited. However, efforts by the US to comply with the WTO ruling have been limited and it is probable that US cotton policy continues to flout WTO rules.

In the currently stalled "Doha Round" of WTO negotiations, four West African states[7] have succeeded in bringing the issue of cotton subsidies and their affects as a special case in the Doha Round of WTO negotiations. As a result of the case that they have made, which has been supported by Tanzania, it was agreed at the Hong Kong WTO Ministerial meeting (December 2005) that as part of the agreement during the Round (paragraph 11-12 of the Ministerial agreement):

- All forms of export subsidies for cotton should have been eliminated by 2006.
- On market access, developed countries will give duty and quota free access for cotton exports from least-developed countries (LDCs) from the commencement of the implementation period.
- Members agree that the objective is that, as an outcome for the negotiations, trade distorting domestic subsidies for cotton production be reduced more ambitiously than under whatever general formula is agreed and that it should be implemented over a shorter period of time than generally applicable.

However, the nature of WTO negotiations is that "nothing is agreed until everything is agreed", meaning that this agreement is meaningless until the WTO negotiations are completed (for agriculture, they began in 2000 and they are continuing, with very limited progress in recent years). Given that the timetable for the completion of the Doha Round agreed at Hong Kong has not been met, it is possible that the measures agreed at that ministerial will need to be re-negotiated if the Round does ever re-gain momentum.

E.3.3 Market prospects

Baffes (2002): Two factors are expected to influence world demand for cotton (Baffes 2002):

- **The share of synthetics in total fibre consumption.** From more than 80% in 1950, cotton's share in total fibre consumption fell to 50% by 1980 and to 42% by the end of the 1990s. A few industrial countries have tried to increase cotton's share in fibre consumption through promotional activities. Results have been favourable, but developing countries have not engaged in similar activities. Even

[7] Mali, Burkina Faso, Benin and Chad.

without such efforts, however, cotton's share could increase because of consumers' growing preference for natural over synthetic products.

- **World income growth.** On the income growth side the picture is more optimistic. With annual world income expected to grow 2.9% from 2008-2030 (World Bank 2007) and an estimated income elasticity of 0.6 (Baffes, 2002), cotton consumption could grow by as much as 1.7% per year, implying a 40% increase in demand over the next 20 years.

  Additionally, there is a strong likelihood that increasing pressure on labour costs in major cotton farming and textile manufacturing countries such as China could increase the competitiveness of Tanzanian producers.

E.4 Fairtrade

A Fairtrade standard for seed cotton production was adopted by Fairtrade Labelling Organisations International (FLO) in 2004. It is applicable to smallholder cotton producer organisations only and only applies to the process of producing raw cotton, not the subsequent processing of cotton in the production of a finished textiles or clothing product. Companies are licensed by the Fairtrade organisations to use the Mark on finished lines including textiles, garments and cotton wool products containing Fairtrade certified cotton coming through a registered transparent supply chain. Companies are required to submit independent verification regarding their compliance with recognised labour standards at all production sites (Fairtrade Foundation, 2005).

As of November 2005, 50 cotton producer organisations from India, Mali, Peru, Senegal and Cameroon had been certified under the standard. Fairtrade certified cotton products have been launched in the UK, France, Switzerland and Belgium.

Typically, producer organisations are certified if they are able to contribute to the social and economic development of their members and communities, and are democratically controlled by their members. However cotton farmers in India and Pakistan are, for historical and cultural reasons, not yet fully organised into formal structures with legal status. FLO is therefore piloting a standard for contract production which enables these small producers to produce Fairtrade cotton.

The Fairtrade Mark is designed to indicate that farmers of the cotton receive a guaranteed and stable price, receive pre-financing where requested, and form longer term, more direct trading relationships with suppliers. The Fairtrade minimum price is set at the farm gate level. If the local market price is higher than this minimum price, then the market price applies. An additional payment of a Fairtrade premium is set aside for farmers' organisations to spend on social and environmental projects or to strengthen their businesses (table E4 shows minimum prices and premia set for different countries).

Table E.4 Fair trade minimum prices and premia (US$)

Country	Type of seed cotton	Fairtrade minimum price per kg	Fairtrade premium per kg
		0.49	0.07
Burkina Faso, Cameroon, Mali, Senegal	Organic	0.57	0.07
India	Organic	0.49	0.05
		0.52	US$
Brazil	Conventional	0.49	0.06
Brazil	Organic	0.58	0.06
Peru	Conventional	0.58	0.06
Peru	Organic	0.66	0.06

Source: Fairtrade Foundation

According to the agreed Fairtrade standards, buyers and sellers in the value chain must be interested in a long term relationship, fair and stable prices. To that end buying/sales commitments are negotiated at the beginning of the harvest season among the parties and fixed in a letter of intent that specifies quantities, quality and price with respect to the conditions for Fairtrade transactions.

When the Fairtrade Foundation first certified cotton in 2005, approved products were mostly clothing and were only available from a handful of independent stores and websites. Now, an expanding range of Fairtrade cotton products can be purchased on the high street of many European countries. At the end of 2006, trade in certified cotton was estimated at US$10 million in the UK alone, a growth of 46% over a 12 month period. This rapid growth is expected to continue.

Evaluations indicate that for many small-scale farmers, the income benefits of Fairtrade may only be small when commodity prices are buoyant, but that they become significant when commodity prices slump (Ruffer 2007). The popular understanding of Fair Trade, most notably present in the media focuses almost exclusively on the issue of 'fair price'. This is most likely due to the intuitive appeal to the consumer of the idea that 'we pay more/they get more'. This somewhat limited understanding of Fair Trade has tended to over-simplify the impact and neglect the role of Fair Trade in the organisational development of producer groups. In fact, most impact assessments[8] have found that, particularly in the cases of cocoa and coffee, many of the effects of Fair Trade on the quality of life of producers are felt through the organisational development supported by Fair Trade organisations. In such cases, the effectiveness of producer control and the transparency of management for the cooperatives and cooperative unions are key.

Seeking Fairtrade certification may be a promising option for some Tanzanian cotton farmers, particularly those already organised into producer groups. Prices offered for Fairtrade cotton appear to compare very favourably with those received for standard cotton in Tanzania. Cotton farmers currently receive in the region of US$0.27 per kg for standard cotton, meaning that Fairtrade cotton could provide a 100% mark-up for farmers.

[8] e.g. Ronchi (2002)

E.5. Organic

Growing organic cotton affords premium prices. Organic cotton farmers generally receive 20% higher prices than their conventional counterparts. Although only 3% of all farmland worldwide is planted with cotton, 20% of chemical pesticides and 22% of all insecticides are sprayed on cotton crops. Eight times more pesticide is used on one hectare of conventional cotton than on a hectare planted with an average food crop.

Organic cotton farmers use a mixture of chilli, garlic and soap to deter pests without destroying their predators. They also plant secondary crops such as sunflower or millet, which mask the scent of cotton that would normally attract pests such as boll weevils. This method of supplementary planting also acts as an insurance policy for the farmer in the event of a poor cotton harvest. As well as protecting the farmers' health, such methods also promote biodiversity.

Several African cotton producing countries - Benin, Mozambique, Senegal, Tanzania, Uganda, and Zimbabwe - began to produce organic cotton in the late 1990s. Some are still at an experimental stage; others are more advanced. Most organic cotton grown in sub-Saharan Africa is project-based and donor supported. Drawing on case studies from Benin, Senegal, Uganda, Tanzania and Zimbabwe, Ferigno et al (2005) argue that organic cotton has much to offer smallholder farmers in sub-Saharan Africa. Experience shows that it is technically feasible, reduces health problems, maintains soil fertility and food security and often supports higher incomes than conventional cotton. All case study projects show positive impacts and empowered, more sustainable communities.

Organic cotton production in Tanzania began in the 1994/95 season. Managed by textile company CIC Limited, initial efforts involved 45 farmers who allocated 141 hectares to organic cotton. A Swiss company handled certification and supervision. Contract farmers were promised support through extension services, including provision of inputs, a guaranteed market at a premium price, and payment in cash. In the second season 110 farmers produced organic cotton on 645 hectares, harvesting 443 tons of seed cotton.

While production was deemed a success (only three farmers dropped out in the first two seasons), internal problems and changes in the textile company’s management delayed purchases of the cotton, which was eventually sold as conventional cotton, without the expected price premium. Despite the marketing failure, the number of registered farmers increased to 134 in the 1996/97 season, with the area planted rising to 778 hectares. Of the 516 harvested tons of fully certified organic cotton, only 60% was marketed as organic, this time by Tansales, Ltd., which took over when CIC, Ltd. went out of business.

Although Tanzania seems well suited to the production of organic cotton, because of the low reliance on chemicals and fertilizer, inspection and certification are still at an early stage (Baffes 2002). In experimental trials farmers readily accepted and produced organic cotton, but the marketing side of the experiment was less successful.