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Cotton Sector Organisation Models and their Impact on Farmer's Productivity and Income

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Abbreviations

ADAF	Appropriate Development for Africa Foundation
BCI	Better Cotton Initiative
CmiA	Cotton made in Africa
COMPACI	Competitive African Cotton Initiative
DEG	German Investment and Development Bank / Deutsche Investitions- und Entwicklungsgesellschaft mbH
ESA	East and Southern Africa
FAO	Food and Agriculture Organization
FLO	Fairtrade Labelling Organization
GDP	Gross Domestic Product
MFI	Microfinance Institution
NGO	Non-Governmental Organisation
NORC	National Opinion Research Center
SSA	sub-Saharan Africa
WCA	West and Central Africa

Summary

Cotton is one of the most important cash crops in sub-Saharan Africa that is almost exclusively grown by smallholder farmers. There are approx. 1.7 million cotton farmers in sub-Saharan Africa who grow cotton in rotation with the cultivation of food crops. Most African cotton farmers and their family members still live below the poverty line of 1.50 USD per day even though the cotton sector is relatively well organised and features a developed infrastructure with agricultural advisory services, research, seed development and established institutions in many parts of Africa. Compared to other cotton producing regions in the world, the growing conditions in Africa also reveal a high level of biodiversity, the sustainable use of water (due to the practice of rainfed farming) and a comparatively modest use of pesticides. In this respect the African cotton sector offers good starting points for targeted policies for combatting poverty, securing food supply and for implementing environmentally-friendly farming methods.

The cotton sector in different countries of sub-Saharan Africa shows different organisational models, ranging from atomistic competition to monopolistic structures. The models differ in their type of service provision and purchase agreements offered to smallholder farmers. As a result there is an ongoing debate over which form of cotton sector organisation offers more benefits to the farmers. This paper will contribute to the discussion in comparing different cotton sector organisation models according to well published indicators, namely their capability to reduce cotton contamination, to provide inputs and to increase the yields and incomes of farmers. The paper will also expand on this ongoing debate by introducing new criteria for the evaluation of the efficiency of cotton sector organisation models, such as their capacity to stabilise purchase prices for farmers, their ability to combine cotton and food crop production and their capability to guarantee social and ecological sustainability to cotton textile buyers in the retail sector.

The paper shows that contract farming based organisation models for the cotton sector provide better results than structures based on atomistic competition with respect to most of the criteria. On the other hand, however, it confirms that each country is well advised not to look for a standard blueprint, but to design its cotton sector organisation system while taking historically developed structures, practices and expectation and behaviour patterns of stakeholders into account.

The empirical basis of this paper is comprised of many years of insight and experience gained through the Competitive African Cotton Initiative (COMPACI) programme. A rich panel data set from African COMPACI partners was analysed. The COMPACI programme endeavours to improve the income and living conditions of around 500,000 African cotton farmers in seven countries (Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique, Zambia and Cameroon).

1 Introduction

The development of the agricultural sector plays a key role in the fight against poverty and in securing the food supply in sub-Saharan Africa. Not only does agriculture account for 65 per cent of the continent's full time employment, for about 25–30 per cent of the gross domestic product (GDP) and over half of total export earnings, but growth originating from agriculture is also known to be twice as effective in reducing poverty as GDP growth originating outside of agriculture (IAASTD 2009a, 2; Yumkella et al. 2011, 17; World Bank 2008, 7). This is why the development of the agricultural sector plays a key role in most development strategies for sub-Saharan Africa (IAASTD 2009a; NEPAD 2009; World Bank 2008; AGRA 2009).

Smallholder farmers must be the backbone of this effort, as smallholder farms account for 80 per cent of the agricultural economy in sub-Saharan Africa (IAASTD 2009b, 6). Improving their productivity is therefore one of the key instruments in combating poverty. Higher productivity generates more income and reduces poverty for both farmers and non-farmers. The increased purchasing power promotes a diversification of the local economies by creating jobs in commerce, small business and handcrafts. This also broadens the economic basis of social networks for supporting needy members of large extended families (Wolz 2005, ii).

While there is a broad consensus in the discussion surrounding developmental policies that the strategies for fighting poverty and for securing the supply of food should first and foremost start with promoting the production of smallholder farmers, controversy sets in when the question arises of what form this support should take (Wolz 2005, 19; IAASTD 2009a, 2). The challenge of providing millions of smallholder farmers with advisory services, high quality seed and other agricultural inputs, as well as organising their access to markets, is immense.

One approach for tackling this challenge is the creation of a link between smallholder farmers and the market through contracts with agro-industrial buyers. This system, which is known as contract farming, is well established for certain products in several sub-Saharan African countries and is often the only opportunity for smallholder farmers to access advisory services and external inputs for agricultural production.[1] Contract farming, however, is often criticised. It is argued that this model is disadvantageous for the farmers, as it is mostly limited to cash crops destined for export and thus might negatively affect the ability of the farmers to produce enough food. According to these critics contract farming is contradictory to self-organisation among farmers, which in turn works

1 *"Contract farming describes pre-agreed supply agreements between farmers and buyers. Usually local farmers grow and deliver agricultural produce in the specified quantity and quality at an agreed date. In exchange the company provides upfront inputs, such as credit, seeds, fertilizer, pesticides and technical advice, all of which may be charged against the final purchase price, and agrees to buy the produce supplied, usually at a specified price"* (Vermeulen / Cotula 2010, 4). There is a wide range of contract farming arrangements, varying from loose verbal terms to highly specified contracts and designations as to which seed, fertiliser, pesticides and techniques must be used and when (Vermeulen / Cotula 2010, 39).

against any strengthening of farmers' position. Furthermore, it prevents the farmers from being able to participate in any of the further processing steps in the value chain. NGO activists as well as liberal economist argue that farmers are likely not to receive a fair share of the world market price in contract farming arrangements (United Nations 2011; Brüntrup / Peltzer 2007, 42; Hoering 2007, 117).

Given this controversy it is appropriate to examine contract farming more closely. This paper does so by looking at the cotton (sub-) sector in sub-Saharan Africa, as in most African countries this sector relies on contract farming in one form or the other, cotton is of significant economic importance for the continent and reaches a significant proportion of the rural population living in poverty. Though there are no precise figures on the number of cotton farmers and the size of area they cultivate in sub-Saharan Africa, conclusions regarding the relevance of the cotton sector within the agricultural sector in sub-Saharan Africa can be drawn based on data from the Food and Agriculture Organization (FAO) and on data gathered through the Competitive African Cotton Initiative (COMPACI).[2] According to FAOstat data cotton was planted on roughly 3.17 million ha in sub-Saharan Africa in 2009, which corresponds to app. 1.55 per cent of all agricultural land.[3] In the COMPACI countries Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique, Zambia and Cameroon, the proportion of agricultural land used for growing cotton is significantly higher (3.86 per cent).[4] COMPACI data shows that the average cotton farmer has a total field size of six to seven hectares (ha), of which on average 1.9 ha are dedicated to growing cotton (NORC 2011, 8).

Several very rough calculations can be made from those figures. It is important to understand them as approximations that can vary greatly from country to country. Nevertheless, the following data indicates the importance of the cotton sector in sub-Saharan Africa: First, it can be assumed that there are app. 1.67 million cotton farmers in sub-Saharan Africa.[5] Secondly, these cotton farmers cultivate roughly 10.86 million ha with cotton and food crops, which corresponds to 5.31 per cent of the agricultural land in sub-Saharan Africa.[6] Thirdly, this proportion is even higher in COMPACI countries, where cotton farmers cultivate app. 4.7 million ha of agricultural land, which corresponds to 13.22 per cent of the agricultural land in the COMPACI countries.

2 A description of the COMPACI programme can be found in the last paragraph of this introduction and in the COMPACI Flyer (DEG / GTZ s.a.).

3 Here and in the following, agricultural land only refers to arable land (farmland) and areas with permanent crops. Permanent meadows and pastures are not included.

4 The following figures were used for these calculations: cotton area in COMPACI countries was 1,375,252 ha and agricultural land area in COMPACI countries was 35,585,000 ha in 2009 (FAO 2012a and FAO 2012b).

5 For this calculation the entire area cultivated with cotton (3.17 million ha) was divided by the average cotton field size (1.9 ha).

6 For this calculation the number of cotton farmers (1.67) was multiplied with the average agricultural area of one cotton farmer (6.5 ha) to calculate the total cultivation area of cotton farmers. With 204,683,700 ha of agricultural land in sub-Saharan Africa, this corresponds to 5.31 per cent.

Taking the average of 6.2 family members per household in COMPACI countries, 10.4 million people in sub-Saharan Africa are estimated to depend on the cultivation of cotton to a significant degree in order to maintain their livelihood. 80 per cent of these cotton farmers and their family members had a per capita income of less than 1.5 USD per day when the COMPACI baseline study was conducted (NORC 2011, 8).

The cotton sector is one of the most organised and structured agricultural sub-sectors in sub-Saharan Africa. The type of structure and regulation of the cotton sector, however, varies from country to country. In general, a distinction can be made between three different models: (1) a model with national or sub-national concession areas (national or regional monopolies), in which a cotton company has the monopoly rights to promote and buy cotton in a specified geographical area; (2) a concentrated competition model in which one or two dominant firms act as market leaders in a competitive market among much smaller competitors; (3) a competitively structured system in which many ginners (20–30) compete vigorously for a market share without anyone of them establishing a dominant position. While concession area agreements still dominate in Western and Central African countries (WCA), which were formerly French colonies, more competitive systems are dominant in Anglophone Eastern and Southern Africa (ESA). The different organisational models also have an impact on the kind of contracts that are possible between firms and cotton farmers. Further explanations of the models and the different types of contract farming schemes are explained in Section 2.

For many years there has been intense discussion, especially in several studies financed by the World Bank and French development cooperation, regarding the advantages and disadvantages of the various organisational forms of the cotton sector and the resulting design of contract farming arrangements for the living conditions of smallholder cotton farmers and for the performance of the cotton sector as a whole.[7]

This paper will contribute to this discussion in supplying additional empirical evidence on the efficiency of the different cotton sector organisational models using some of the known indicators from Tschirley et al. (2010), such as quality, provision of credit, productivity (cotton yield/ha) and farmer incomes from cotton. In addition to these it introduces new criteria for the evaluation of the different organisational models, such as their ability to stabilize cotton purchase prices and thus income for farmers, to integrate the promotion of food crops in the cotton extension service model and to facilitate the implementation of sustainability standards that are being demanded more and more by international retailers and consumers of cotton textiles.

The empirical basis of this paper is comprised of many years of insight and experience gained through the COMPACI program. The COMPACI programme endeavours to

7 The following two essays summarise the studies that compare various organisation forms in the cotton sector: Poulton / Tschirley / Plerhoples (2010) and Tschirley et al. (2010, 295–323).

improve the income and living conditions of around 500,000 African cotton farmers in seven countries (Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique, Zambia and Cameroon).[8] This programme is financed in part by the Bill & Melinda Gates Foundation (BMGF) and the German Federal Ministry for Economic Cooperation and Development (BMZ). An independent evaluation of the COMPACI programme through the National Opinion Research Center (NORC) in Chicago began in early 2009. The implementation of this programme and the evaluation performed by NORC has produced a large volume of data and findings that can contribute to the discussion outlined above.[9]

2 Conceptual and empirical approach

2.1 Organisational models of the African cotton sector

The following typology and explanation of organisation models of the African cotton sector is modelled after Tschirley et al. (2010, 299), who differentiate between five organisational forms. For the sake of simplicity, state and regional monopolies have been combined into one category and the hybrid system described by Tschirley et al. (2010, 299), under which Benin would fall, will not be discussed.[10] A differentiation will therefore be made between the following three models:

(1) The **national or sub-national (regional) monopoly:** In this model one company has the monopoly right to promote and buy cotton in specified geographical areas and farmers are therefore obliged to work with these state-run or private cotton companies. Thus, the cotton company "controls" all cotton production in a country or a concession area / region. National monopolies exist in Mali and Cameroon (state-owned cotton companies), Senegal (private cotton company) and Togo (state-owned cotton company with minority shares held by farmers' organisations), for example. In Mozambique and Burkina Faso, on the other hand, there are regional concessions areas, in which state-run or private cotton companies have regional monopolies in specific areas.

(2) The **concentrated competition model**: In this competitive, market-based system a few strong private cotton companies dominate the greater part of the market. They act as market leaders among much smaller competitors. Under this model cotton farmers may choose the cotton company with which they wish to enter a contract. This system exists in

8 The above-named COMPACI programme currently includes 486,000 farmers in Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique and Zambia. There is also a public private partnership project, which is carried out by the Deutsche Investitions- und Entwicklungsgesellschaft mbH (DEG) and Sodecoton Cameroon, linked to the programme. Sodecoton has contractual relationships with 160,000 farmers.

9 The NORC data, however, only refers to the countries Benin, Burkina Faso, Côte d'Ivoire, Malawi, Mozambique and Zambia. There is no NORC data available for Cameroon.

10 Most recent information indicates that Benin will move "back" to a concession area model.

Zambia, Zimbabwe and, since recently, in Côte d'Ivoire, where the original concession area system has been phased out in favour of concentrated competition.[11]

(3) The **atomistic competition model**: In this competitively structured system a large number of cotton companies compete vigorously for a market share and for the smallholder farmers' cotton. None of them has established a dominant position. This system is prevalent in Tanzania and is being mandated by the government in Malawi.

Since this paper is based on the experience and data of the COMPACI countries, Table 1 classifies the COMPACI countries according to the above categorization.

Table 1: Typology of the organisation of the African cotton sector and the companies collaborating with COMPACI*

National/ Regional Monopoly	Concentrated Competition	Atomistic Competition
Cameroon (*Sodecoton*)	Côte d'Ivoire (*Ivoire Coton*)[a]	Malawi (*GLCC*)[b]
Mozambique (*Plexus Mozambique*)	Zambia (*Cargill, Dunavant*)	
Burkina Faso (*Faso Coton*)		

* Benin is not included in the categorization, as it falls within a hybrid system.

a = The cotton sector in Côte d'Ivoire was a monopolistic system for many years and only changed to concentrated competition in 2001. Therefore many characteristics of the monopoly system are still present as can be seen in the analysis in Section 3.

b = GLCC has a strong presence in the Malawi market, but is confronted with atomistic competition when it comes to purchasing cotton.

Source: own figure based on Tschirley et al. (2010, 299)

2.2 Contract farming and the competition-coordination trade-off

The different organisational models have an impact on the design of the contractual relationship between cotton companies and cotton farmers. Whereas contract farming arrangements exist under the national or sub-national monopoly and within the concentrated competition model, there are no contractual relationships within the competitively structured system.

In general, contract farming arrangements within the cotton sector imply that the cotton companies operating the gins for delinting the cotton pre-finance the seed and, in varying degrees, the inputs for cotton production like fertiliser, pesticides and sprayers, for the farmers. In some cases, in which stable, long-term contractual relationships exist between the cotton company and the contract farmers, investment goods, such as tractors, oxen,

11 The commission currently in charge of reviewing the cotton and the cashew sector on behalf of the government considers moving back to a system with clearly defined concession areas, however.

ploughs and other agricultural equipment, can also be pre-financed. The companies also provide agricultural advisory services and play a role in the maintenance of rural roads. In return for pre-financing services, the farmers pledge to deliver their cotton to the cotton company. The purchase price for the cotton can either be set before the seed is planted or during the marketing season. Upon delivery of the cotton, the cotton company deducts the fees for the pre-financing services from the amount owed to the farmer.

Under contractual models cotton companies provide agricultural advisory services through a relatively dense network of full-time extension workers and/or pilot farmers, who advise the farmers during the growing and harvest periods. In general, a ratio of one extension worker per 250–300 farmers can be considered as adequate. This is particularly true when pilot farmers with demonstration fields complement the services provided by the extension service from the cotton companies. With this number of extension workers available, the farmers are able to receive regular training in effective agricultural practices and harvesting techniques to improve the cotton quality and to adapt as new seeds, technologies and conditions emerge.

In the late 80's and early 90's the World Bank polemicised against the contract farming system with parastatal (monopoly) cotton companies developed since independence by the French government in WCA and pushed for privatisation through a number of structural adjustment programmes (Delpuche / Leblois 2011, 7). Their central concern was that the smallholder farmer does not receive a fair cotton purchase price because of the monopolistic system, in which the price is not determined through competition. They argued for a competitive organisation model with free pricing. The French side, as well as governments in WCA, argued that the decisive criterion for assessing the performance of an organisational model was not the price per kg, but rather the farmer's net profit per hectare. A monopolistic and/or concession system would allow farmers to pre-finance inputs of production and investment goods in order to increase their productivity, so that after deducting the pre-financing costs the farmers would be left with a higher net profit, even if per kg prices would be lower under this system in order to pay for the large administrative and transaction costs.

Meanwhile, the World Bank backed away from its liberalisation dogma and thus the fierce advocacy for a liberal organisation of the cotton value chain is no longer the focus of the debate. Still, there is an ongoing debate on the efficiency of the various organisational models in the cotton sector, which is at the same time a debate on the efficiency of contract farming in general. This discussion is headed by the research performed by Tschirley et al. (2010, 295 ff.) and Poulton et al. (2010), who evaluate the organisational forms of the cotton sector along various indicators. Within their studies the perception that there is a trade-off between coordination (generally more present in WCA countries) and competition (prevailing in ESA countries) is still present and is discussed under the term "competition-coordination trade-off." According to it the competitive market system is expected to deliver attractive cotton prices for the producer, but is rarely able to deliver inputs, credits or to achieve high lint quality, while the concentrated market system allows for the de-

livery of inputs, credits and achieves a high lint quality, but is expected to deliver lower cotton prices to producers than the competitive system over time (Tschirley / Poulton / Labaste 2009 in Poulton et al. 2010, 10 ff.).

2.3 Analytical framework and empirical indicators

Since the goal of this paper is to assess the advantages and disadvantages of the various organisational forms of the cotton sector and the respective design of contract farming arrangements for the living conditions of smallholder cotton farmers, indicators that measure the influence of the cotton sector organisation at the farm level must be chosen. Tschirley et al. (2010, 300) chose the indicators displayed in Table 2 to measure the cotton sector's performance.

Table 2: Indicators for cotton sector performance used by Tschirley et al.

Type of indicator	Measured by
Quality and marketing	Estimated national average realized premium over Cotlook A index (US$/lb lint), an index for market prices for African cotton
Pricing	Mean per cent price paid to farmers at local market place
Input provision	a) Per cent of cotton farmers receiving input credit b) Adequacy / quality of input credit package, if provided c) Repayment rate
Extension	a) Cotton companies providing assistance: yes or no b) Qualitative assessment
Research	No. of varieties released and taken up, past 10 years
Yield	Kg of seed cotton produced per ha
Consumer welfare	Returns per day of family labour (US$/day)
Overall competitiveness	Ratio, total FOT cost to total FOT value
Net impact	a) Total value-added per capita (including value of seed sales) b) Net budgetary contribution per capita (taxes paid minus transfers received)

Source: based on Tschirley et al. (2010, 300 ff.)

For the purpose of this paper we dropped some of the indicators and introduced three new criteria for the discussion of the organisational forms of the cotton sector. Our list of indicators can be seen in Table 3.

Table 3: Indicators used in this study for the examination of cotton sector performance	
Type of indicator	**Measured by**
Quality	Level of contamination determined by expert opinion
Access to credit	a) Provision of input credits b) Provision of investment credits
Yield	Kg of seed cotton produced per ha
Pricing	Farmers share of world market price
Income	Net revenue of farmers per ha cotton
Price stability	Qualitative assessment
Food production	Qualitative assessment
Environmental and social standards	Qualitative assessment
Source: own compilation	

The criteria were adapted due to the following facts and considerations: This paper is based on monitoring and evaluation reports presented by COMPACI partners between 2007 and 2012 and on NORC surveys, which only report on access to credit, yields, prices, income and, to some extent, quality aspects. Second, the new indicators, i.e. price stability, food production and environmental and social standards, play a major role in present discussions on the living conditions of the smallholder farmers and/or their competitiveness on the international market.

3 Cotton sector performance within the COMPACI countries

3.1 Quality

The quality of cotton is measured based on the characteristics of the cotton fibres and on the degree of contamination of the cotton with foreign substances, especially polypropylene. African cotton is known for some good characteristics in its cotton fibre based on a global comparison, but the degree of contamination of the cotton varies greatly throughout the continent (Tschirley et al. 2010, 303).

Tschirley et al. (2010, 304) argue that the quality of the cotton (here always referred to in the context of non-contamination) is best under the concentrated competition model. This is because two main conditions need to be in place for a sector to produce high quality lint: (1) Ginners need to be able to control their supply chain, which means in practice that they are able to provide clear incentives for farmers to deliver uncontaminated and well sorted cotton; (2) ginners must have the incentive to do this. According to Tschirley et al. (2010, 304 f.) those two conditions are best met in a concentrated sector, because the concentrated system allows for the control of supply chains without becoming inefficient, which tends to be the case with monopolistic systems. Nevertheless, Tschirley et al. (2010, 305) state that performance among monopolistic systems is highly variable, mostly depend-

ing on the level of political interference. Atomistic competition models tend to completely negate quality aspects. They support this argument in part by pointing to the quality premiums received by Zambian cotton over the Cotlook A Index (Tschirley et al. 2010, 303 f.).

Zambian cotton has in fact, for African standards, a relatively high degree of non-contamination, but it is questionable whether or not this is due to the organisational form of the sector. Insofar as the term quality refers to a low degree of polypropylene contamination, the fact that farmers in WCA – despite all training – generally use polypropylene fertiliser bags during the harvest is the reason for the systematically higher degree of polypropylene contamination in cotton from WCA compared to ESA. Since farmers in ESA, with the exception of Zimbabwe, do not use mineral fertiliser, they don't have these plastic bags available for "misuse" during the harvest. Additionally, Dunavant and Cargill Zambia, in particular, worked very hard to remove contamination. The cotton is fed into the gin on conveyors while women sit and manually remove foreign objects. In WCA, on the other hand, the cotton is vacuumed out of the delivery trucks and sent directly to the gin.

It is also not as clear as Tschirley et al. (2010, 303) claim that the spinning mills demand non-contaminated cotton. There is, in fact, a demand for low quality cotton (for example for jeans, tissues etc.). Often it is also cheaper for the spinning mills to remove contamination themselves instead of paying higher prices to ginners or better quality. For this reason, Dunavant is currently considering reducing its efforts to decontaminate, as the high costs are not completely compensated by the premiums that are paid for it.

These explanations and the assessment of the cotton quality of the COMPACI partners in terms of non-contamination seen in Figure 4 show that a causal relationship between sector organisation and cotton quality cannot be easily identified. Regardless of the organisational form, all parties must find an answer to the question of quality (non-contamination) that is appropriate for their specific markets and production conditions.

The introduction of polyethylene fertiliser bags in WCA would be a big step forward. This however was intensely discussed and then rejected for technical reasons years ago, primarily due to the low stability and poor tear resistance of polyethylene fertiliser bags.

Table 4: Cotton quality and sector organisation

Sector type	Cotton company	Quality
Monopoly	SODECOTON (*Cameroon*)	+
	Plexus (*Mozambique*)	+
	Faso Coton (*Burkina Faso*)	–
Concentrated Competition	Ivoire Coton (*Côte d'Ivoire*)	–
	Dunavant; Cargill (*Zambia*)	++
Atomistic Competition	GLCC (*Malawi*)	+

– = Partly contamin. + = good ++ = very good

Source: own assessments

3.2 Access to input and investment loans

There is, however, a close link between the organisational form of the sector and its ability to provide credits. The following link can be made in principle: the stronger the bond between the farmer and the cotton company and the greater the extent to which side selling[12] can be eliminated, the more comprehensive the services that the cotton company is willing to pre-finance for the smallholder farmers. The provision of credit is therefore generally better in monopolistic systems, which are traditionally prevalent in WCA, than in systems with concentrated competition or atomistic competition. The cotton companies that work in regional or national monopolies also experience – due to the system – very high repayment rates, provided the cotton is not smuggled into neighbouring countries.

Table 5, however, shows that there are a few country-specific exceptions, such as Ivoire Coton, which is able to provide very good input credits as well as investment loans under the system of concentrated competition, and Plexus Mozambique, which is rather poor in input credit provision even in a concession system. These two cases will be briefly discussed in the following.

Table 5: Credit supply and sector organisation

Sector type	Cotton company	Input credits	Investment credits
Monopoly	SODECOTON (*Cameroon*)	++	+
	Plexus (*Mozambique*)	+	–
	Faso Coton (*Burkina Faso*)	++	+
Concentrated Competition	Ivoire Coton (*Côte d'Ivoire*)	++	++
	Dunavant; Cargill (*Zambia*)	+	→ +
Atomistic Competition	GLCC (*Malawi*)	–	–

– = No credits + = good ++ = very good → = Development

Source: own assessments

Ivoire Coton initially worked under a concession arrangement (monopoly) for quite some time and is still able to maintain strong relationships with approx. 90 per cent of the smallholder farmers of its former concession area under the current system of concentrated competition. They are therefore willing to provide 75 per cent of their farmers with oxen, insurance for the oxen and veterinary services (Diomande 2010, 3). This shows that long-term loans can be provided in systems with concentrated competition, provided there is a long-standing and intimate relationship between the cotton companies and the smallholder farmers.

Plexus Mozambique offers only very limited pre-finance services even though it operates in a concession region and despite the general tendency of monopolistic systems to better

12 Side selling is the act of not selling all or part of the cotton to the cotton company that pre-financed the harvest and instead selling to another buyer or cotton company.

provide farmers with input and investment loans. This shows that the organisational form of the sector alone does not guarantee a good performance on the part of the cotton company, even if expected in theory.[13] The major reason is that systematic efforts to improve the performance of smallholder cotton farmer only recently began in Mozambique.

Apart from these exceptions, our data confirm that contract farming systems with strong commitments between the parties create a basis for the systematic pre-financing of farmers. Input supply, quality control and extension services are the first to suffer when the number of competing cotton companies rises in a certain country (Tschirley et al. 2010, 307 ff.).

The cotton companies are probably the largest rural and agricultural microfinancers in their respective countries with input and investment financing combined. They have three advantages over traditional microfinance institutions (MFIs): (1) Transaction costs are low, as credit is awarded through pre-existing advisory and purchasing structures; (2) the credit is secured through the future delivery of cotton, provided there is no substantial side selling; (3) interest rates for farmers are moderate, as the cotton companies are generally able to refinance through local banks at favourable rates. An MFI in Côte d'Ivoire, for example, which only accepts large scale farmers as customers, has to calculate an interest rate of 20-25 per cent to cover their costs, while the cotton company Ivoire Coton is able to cover its entire credit costs at 11 per cent interest.[14]

There are, however, disadvantages in only providing credit to farmers through the cotton companies. These loans are generally tied to cotton production and cannot be used to cover the farmers' other needs. These loans also increase the farmers' dependency on the cotton companies – at least for one season. For this reason, the COMPACI programme is working with ADAF, a non-government organisation in Cameroon, to test the introduction of cooperative banks for cotton farmers in northern Cameroon and in the growing areas around Chipata in Zambia. These banks will be refinanced exclusively through the farmers' savings. In order to secure the input and harvest pre-financing loans, the cotton company pledges to transfer the proceeds from the cotton purchased from the farmer directly to the farmer's account at the cooperative bank so that the bank can directly deduct the repayment of the loan (see Figure 1).

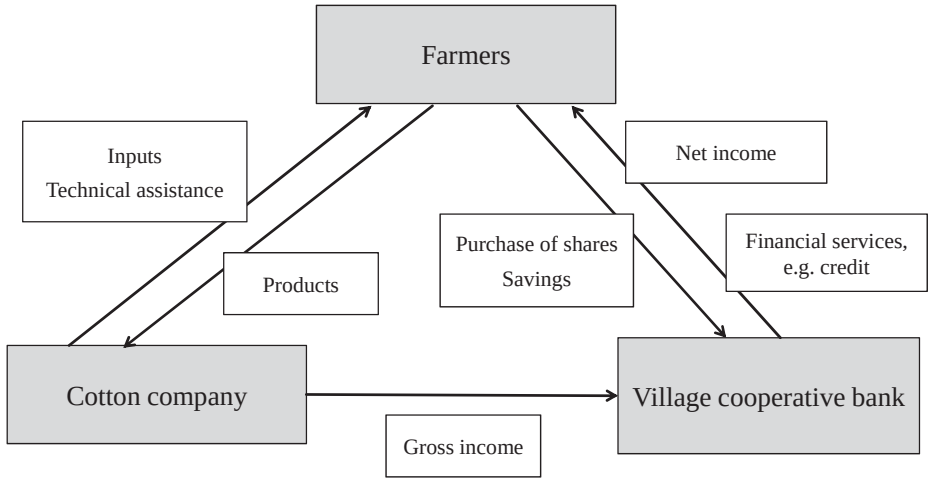
A low-cost operating concept, low refinancing costs (savings of the farmers) and close cooperation with the cotton company, at least during the development phase, are factors that can make this concept successful. Close ties to well-run local African commercial banks, which provide support services and monitoring, can help avoid governance and management problems in such village cooperative banks.[15]

13 Significant improvement in the support and provision of inputs to farmers has been seen since Plexus Mozambique joined COMPACI at the start of 2010.

14 The noted interest rates are based on surveys by Roger Peltzer of MFI's in December 2011 in Boundiali in northern Côte d'Ivoire.

15 Compare Mees / Bomda (2006).

Figure 1: System for input financing through village cooperative banks



Source: own design

3.3 Cotton yields, farmers' share of the cotton world market price and revenue

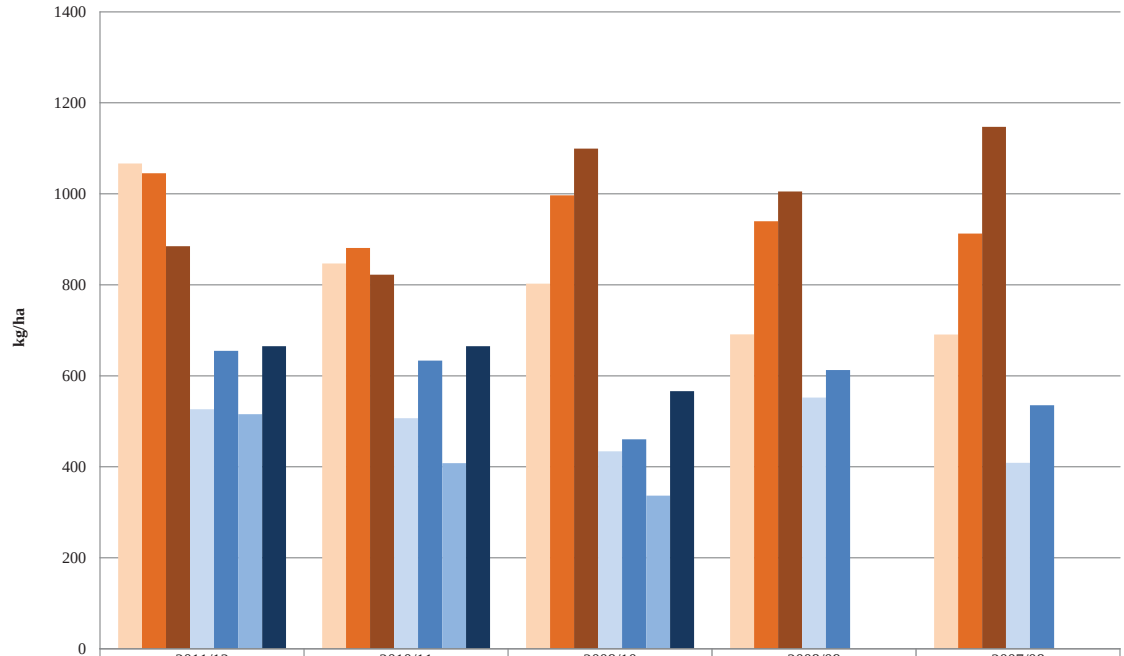
Besides natural factors, high cotton yields are mainly a result of good pre-harvest service provision (input credit provision, especially fertiliser use and extension services), which are generally better provided by regulated markets, as are historically prevalent in WCA (see Section 3.2). As can be seen in Figure 2, there are definitely higher yields (kg/ha) in WCA. Nevertheless, two questions remain open: First, if and to what extent farmers in regulated markets receive a lower share of the world market price of cotton, and second, whether or not the higher yields can compensate the higher input cost. This can be analysed when comparing the net revenue of farmers.

To add to this discussion, the authors compiled the following information based on information provided by COMPACI partners over a period of five years: yields in kg per ha, farmer's share of world market price and farmers' net income in USD per ha.[16] In the following discussion countries are grouped into WCA (Benin, Burkina Faso, Côte d'Ivoire) and ESA countries (Malawi, Mozambique, Zambia), where the hybrid sector of Benin is included under WCA, as it also provides extension services and input credits to the cotton farmers.[17] This grouping does not completely fit into the organisational model of Tschirley. Historically, however, cotton sectors in WCA countries have been more regu lated and thus been able to provide mineral fertilisers to the farmers, which is (except in Zimbabwe) not the case in ESA countries.

16 Yield and, consequently, income data per ha from Malawi are, however, to be regarded with caution. Malawi's yield statistics are quite unreliable estimates, as cotton companies – due to the lack of contract relations with the farmers – cannot relate the cotton purchased to the seeds that were handed out to the farmers and thus to the area planted.

17 Cameroon is not included in the following elaborations, as it is only connected with the COMPACI programme as a public private partnership project and therefore not all of the relevant data is available.

Figure 2: Seed cotton productivity (kg/ha)*



	2011/12	2010/11	2009/10	2008/09	2007/08
Faso Coton	1066,68	846,71	802,62	691,10	690,79
Ivoire Coton	1045,23	880,91	996,66	939,99	912,63
AIC Benin	884,99	822,02	1099,45	1005,12	1147,25
Dunavant	526,65	506,82	434,09	552,28	408,92
Cargill	654,71	633,67	460,18	612,58	535,55
Plexus	515,96	407,98	336,41		
GLCC	665,00	665,00	566,00		

* Plexus and GLCC figures are only available since 2009/10.

Source: COMPACI data

Cotton Yields

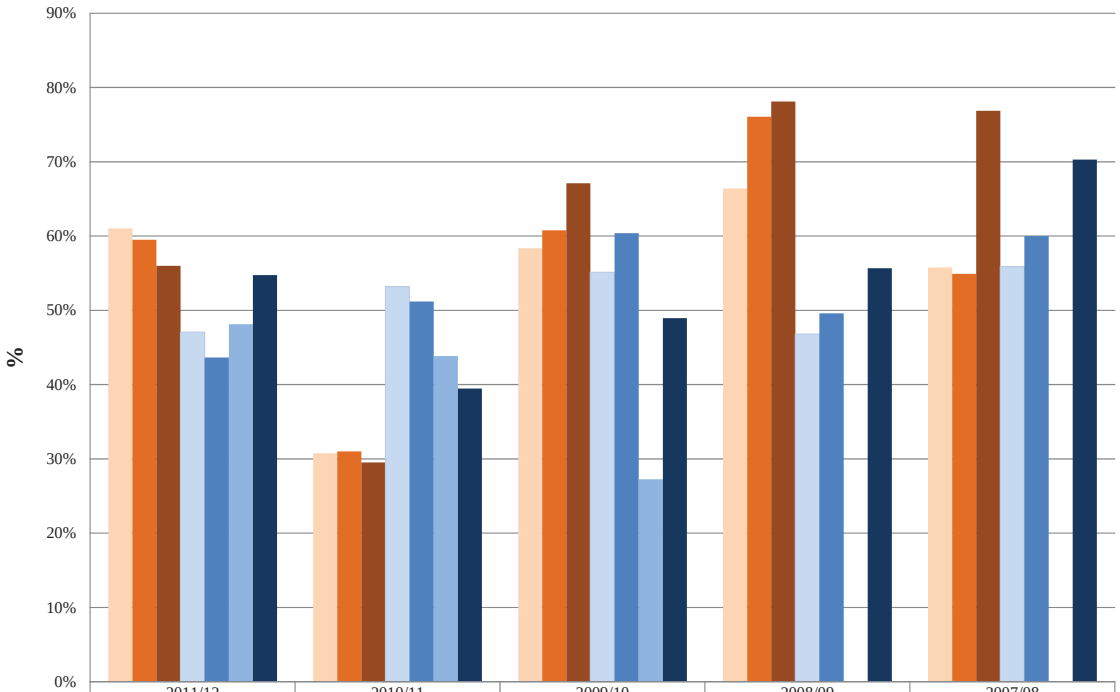
With regards to the differences in mean cotton yields per ha, the COMPACI cotton farmers confirm what is found in literature, namely that the mean yields in WCA are significantly higher than in ESA. This is due to the fact that unlike in ESA, fertiliser (primarily mineral fertiliser, but increasingly organic fertiliser, as well) is used for growing cotton in WCA.

It is interesting to state that according to Tschirley et al. (2010, 312) this difference in yields does not mean that all farmers in ESA have low cotton yields. Their research found that the better off farmers in ESA (those with access to inputs, ownership of assets, especially ploughing equipment and oxen) produce as much as their counterparts in WCA. "WCA's advantage lies in the fact that it has through sustained effort over many years in research, input provision, and extension (including promoting ownership of animal traction equipment), moved a much higher share of farmers into the top groups" (Tschirley et al. 2010, 312). Consequently assisting more farmers in increasing their asset base as well as enhancing their productivity is important for the competitiveness of a sector as well as for poverty reduction.

Farmers' share of world market prices for cotton

When looking at the farmers' share of world market prices for cotton, a much more complex picture arises. Figure 3 shows the share of the cotton world market price received by farmers in the respective COMPACI countries over the past five years. As one can see farmers in WCA with monopolized pricing systems do not systematically receive a smaller share of the world market price than farmers in ESA, where, with the exception of Mozambique, pricing depends more strongly on competition. This allows the concept of competition-coordination trade-off put forth by Poulton et al. (2010, 13) to be questioned.

Figure 3: Farmers' share of world market price*



	2011/12	2010/11	2009/10	2008/09	2007/08
Faso Coton	61,04%	31%	58%	66,41%	55,77%
Ivoire Coton	59,50%	31%	61%	76,06%	54,91%
AIC Benin	56,00%	30%	67%	78,11%	76,87%
Dunavant	47,06%	53%	55%	46,79%	55,88%
Cargill	43,65%	51%	60%	49,59%	60,00%
Plexus	48,12%	44%	27%		
GLCC	54,74%	39%	49%	55,68%	70,27%

* Plexus entered the programme only in 2009/10 and figures from ESA are not yet available for the 2011/12 season.

Source: COMPACI data

It should, however, be noted that the cotton companies' practice of forward selling coupled with the announcement of a cotton purchase price prior to planting in WCA can go both ways for the farmers. When prices fall it cushions the downswing. When prices increase significantly, however, the prices paid to the farmers are well under the world market prices. Both cases can be found in Figure 8: In season 2010/11 the cotton world market price increased significantly from the time of the forward sale in June 2010 to the harvest in WCA in December/January 2011. Therefore farmers in WCA received a relatively low

share of the world market price in season 2010/11. However, the opposite effect can be seen for the 2011/12 season, as the world market price greatly decreased after the announcement of the purchase price and therefore cotton farmers in WCA received a higher share of world market price than their counterparts in ESA in 2011/12.

In ESA on the other hand, prices are set in closer chronological proximity to the world market prices, which can lead to higher shares of world market price when it is favourable, but also makes planning for farmers more complicated. This is an important factor to consider in evaluating farmers' share in world market prices over a longer period of time.

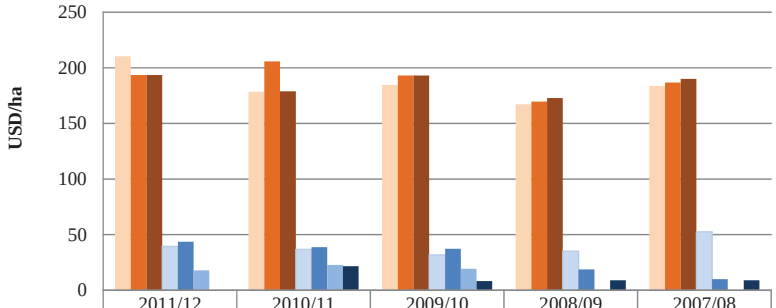
Net revenue from cotton

Even more than individual components of profitability, the net revenue derived from cotton is important for the farmer. The net revenue a farmer receives from cultivating cotton is a function of the productivity (kg/ha), the cotton price and the price he/she has to pay for agricultural inputs (seeds, fertiliser, chemicals). Even though labour is also an important cost factor, it is not taken into account in the following calculations for Figures 9 and 10, as it is hard to examine and reliable figures are not available for the respective COMPACI countries.

Figure 4 shows the huge difference farmers pay for inputs in WCA compared to ESA. This is mainly due to the fact that expensive mineral fertilisers are not used in ESA (except in Zimbabwe, which is not a COMPACI country).

Comparing input use with the cotton productivity in Figure 2, it is clear that the inputs in WCA also produce higher cotton yields. Nevertheless, those higher yields do not always

Figure 4: Input cost (USD/ha)*



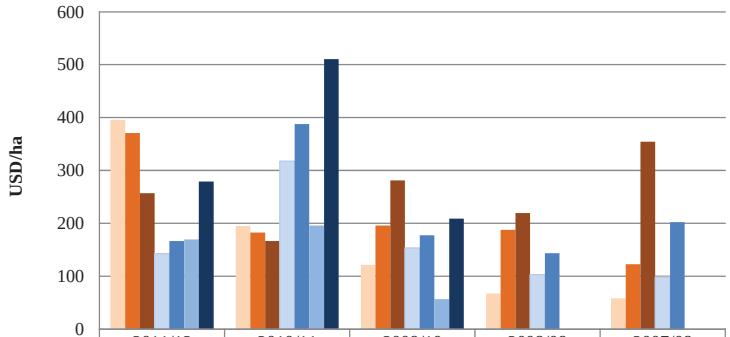
	2011/12	2010/11	2009/10	2008/09	2007/08
Faso Coton	210,36	178,48	184,69	167,17	183,87
Ivoire Coton	193,56	205,90	193,19	169,84	186,81
AIC Benin	193,54	178,78	193,19	172,80	190,07
Dunavant	39,50	36,80	31,85	35,09	52,55
Cargill	43,65	38,80	37,43	18,77	9,97
Plexus	17,97	22,86	19,44		
GLCC	0,00	21,57	8,41	9,02	9,06

* Plexus entered the programme only in 2009/10.

Source: COMPACI data

lead to higher net incomes, as can be seen in Figure 5, which combines gross prices paid to the farmer with the deducted input cost. Here we see a rather mixed picture that shows that higher input cost are not always compensated by higher yields.

Figure 5: Farmers' net revenue from cotton (USD/ha)*1,*2



	2011/12	2010/11	2009/10	2008/09	2007/08
Faso Coton	395,67	195,07	121,41	67,14	58,12
Ivoire Coton	370,73	182,73	195,97	187,47	122,57
AIC Benin	257,19	166,60	281,03	219,59	354,42
Dunavant	142,65	317,60	153,09	102,74	98,12
Cargill	166,38	387,65	177,30	143,28	201,92
Plexus	169,24	195,70	56,37		
GLCC	278,77	510,43	208,69		

*1 Net incomes are calculated without labour costs.
*2 Plexus and GLCC figures are only available since 2009/10.

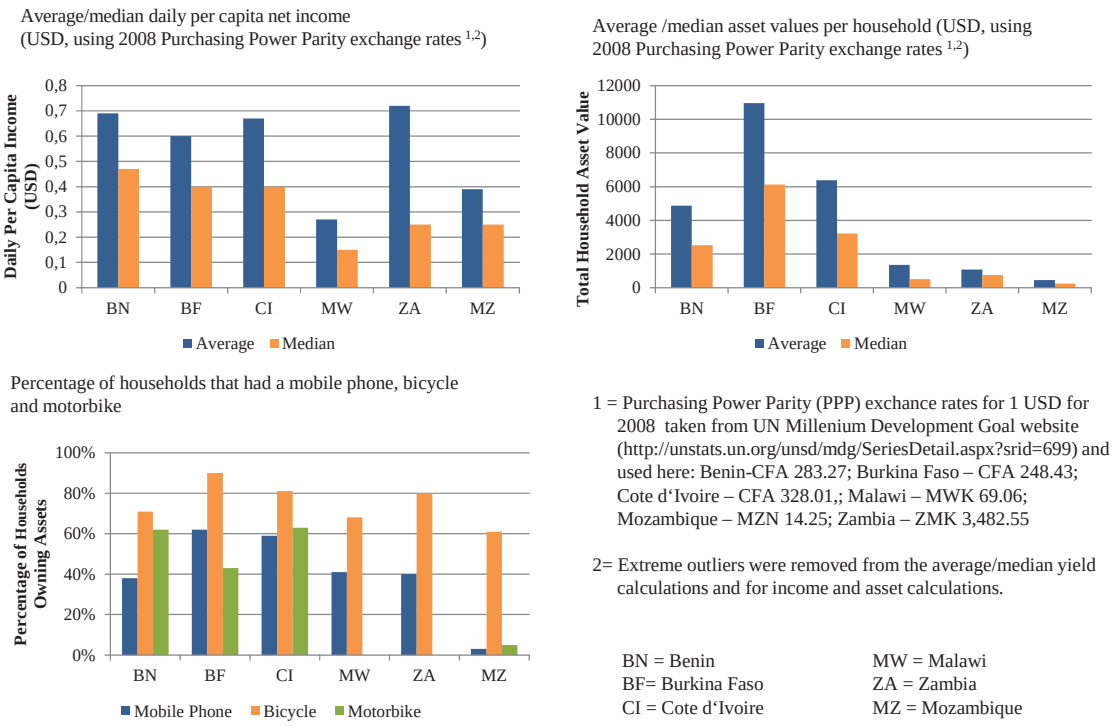
Source: COMPACI data

However, another conclusion can be drawn: The use of mineral fertiliser in WCA only makes sense – at least when simply looking at cotton – when farmers receive a high price for cotton and/or are able to achieve high yields because of very good agricultural practices. The higher costs associated with using mineral fertiliser will not be compensated by the additional yield when low cotton prices occur combined with a low application of good agricultural practices.[18]

When interpreting the figures, it should, however, also be noted that the cotton companies use standard values for fertiliser costs/ha in their revenue calculations. But many farmers use a portion of the fertiliser for growing other crops that cover 72% of their farm area on average (see Section 1), especially when the prices are relatively low, which in turn leads to lower cotton yields. Thus, looking at the farmers' net revenue based solely on the cultivation of cotton is insufficient, as their total farm production has to be taken into account. For this reason the total income of the cotton farmer's household is a much more meaningful figure. Statistics on the per capita income of the cotton farmers' households were also gathered by COMPACI. The results can be seen in Figure 6.

18 The same applies for the use of transgenic seed. As an additional consequence, it is advantageous for cotton companies and farmers if only those farmers with high yield potential use mineral fertiliser. This strategy is pursued by DZL, as well as Cargill in Zambia, both of which began providing mineral fertiliser on credit only for select farmers. In selecting candidates they focused on farmers with the highest yield potential.

Figure 6: Per capita income and provision of assets



Source: NORC (2011)

The per capita income of the cotton farmers (as well as the provision of assets like motorcycles, bicycles and mobile telephones) is significantly higher in WCA than in ESA. It can be reasonably assumed that the higher living standard of cotton farmers in WCA is the result of the efficiency of the whole farming system in WCA, which is the result of a well designed cotton sector policy decades ago.

However, there are clear lessons for the optimisation of yields and input costs. Input supply should be concentrated on farmers showing high adoption rates of good agricultural practices. Cotton companies should furthermore design careful policies to also address the farmers' needs for fertilisers for their food crop production (see Section 3.5 below). Furthermore, the utilization of organic manure should be promoted.

3.4 Price volatility – a core problem not only for farmers

The high fluctuations of the cotton price due to the heavily fluctuating world market prices and exchange rates for local currencies vs. the dollar[19] are seen as a major problem by the farmers. In contract farming arrangements in WCA this fluctuating price is balanced by setting the purchase price for cotton before the seed is planted (pre-planting price). This

19 According to a study by Ecobank, the cotton price fluctuations from 2007 to 2010 by far showed the greatest volatility of all African soft commodities (see Aithnard 2011, 5 ff.).

allows farmers to calculate how much cotton they want to plant, what inputs they want to use and how high their potential income might be at the end of the season. Such a pre-planting price can lead to purchase prices below world market prices at the time of harvest. In ESA, the purchase price is not announced until the start of the harvest and then often fluctuates during the two to three-month long buying season, especially in a system with atomistic competition. Even though a price competition initially seems favourable for the farmers as it allows for higher prices, it can lead to severe problems, as the following example illustrates: In the summer of 2010 the price of cotton doubled during the buying season, because the cotton companies in Zambia and Malawi entered a bidding war in light of a scarce harvest and rising world market prices. The farmers who sold their harvest early, which is desirable with regards to quality criteria, were therefore disadvantaged. This unequal treatment led to much discontent, something that became very clear in interviews with the farmers (Neubert / NORC 2010, 11 ff.; Peltzer / Neubert 2011, 473). More equality, even at the cost of lower prices, could be much more valuable for the social peace in the cotton regions. In a system of concentrated competition it is more likely that, pushed by the market leaders, cotton companies might agree on a more stable purchase price policy during the buying season, as has been the practice in Zambia since 2011.

The strongly fluctuating world market prices not only create problems for the farmers, but also for the cotton companies and traders, especially in WCA, where the purchase prices are set prior to planting. Here, cotton companies need to forward sell at least part of the harvest six to 14 months in order to secure the announced price. Consequently, the cotton companies face significant production risks, as the forward sale occurs at a time when the actual production cannot be predicted. Another risk is that a counterparty – for example a spinning mill in China – will not fulfil the buying contract, whether under a pretext or not, when cotton prices decline sharply in the meantime. This also can result in a situation like the one seen in January 2011 in WCA. While the cotton companies in Benin and Cameroon secured their sales prices six months before the harvest, the spinning mills in neighbouring Nigeria did not buy ahead. Since the cotton price rose sharply once again between the time of the forward sale (June/July 2010) and harvest time in January 2011, the spinning mills and gins in Nigeria were able – and had no choice but – to offer significantly higher prices for the cotton than the cotton companies in Benin and Cameroon were able to pay their farmers. Many farmers in these two countries broke their contracts and sold their cotton in Nigeria instead. The cotton companies in Benin and Cameroon were disadvantaged and were only able to fulfil their forward delivery contracts at a great effort and, in part, with substantial losses.

However, the combination of pre-planting prices and cotton purchase price formulas, which refer to an average one-year world markets price, forces cotton companies in WCA to carefully balance forward sales over 12 months and longer. If this is properly done, market price fluctuations can be partially eliminated. Most cotton companies in ESA on the other hand relate their cotton purchase prices to the world market price at harvest time. This is a major reason why cotton companies in WCA are able to maintain a rather high

purchase price for the ongoing 2012/13 harvest, while cotton purchase prices in ESA (Zambia/Malawi) were cut by 50 per cent in 2012.

These elaborations show that the business of buying and selling cotton and securing the price of cotton are linked to significant commercial risks. The advice offered by liberal economists to create instruments that allow farmers to forward sell more easily is problematic, as it exposes farmers to the above-named economic risks, which are now largely borne by the cotton companies and cotton traders. It rarely makes sense for African smallholder farmers to assume the significant hedging risks on the global commodity markets.

An open question is whether there are solutions to cushion price fluctuations. A refined model was established in Burkina Faso – currently the largest cotton producer in sub-Saharan Africa – with the help of the World Bank and the French development cooperation. In this model, the pre-announced purchase price for cotton is based on the average world market price over the last three years and on forecasted prices. If the market prices are higher than the announced price determined on this basis, a so-called *Fonds de Lissage* is built; if the prices are below the reference price, this fund pays out a price support (AfdL 2008). The base capital of the *Fonds de Lissage* was funded by donors. Its management is assured in a very transparent way by a commercial bank, which should exclude mismanagement and corruption, which negatively affected former price stabilisation funds in many WCA countries. A final evaluation of the functionality and effect of the fund will not be possible until several cycles have been completed. The fund was established in 2007 after a previously existing equalisation fund became insolvent having faced a prolonged period of low prices for cotton. From 2008–2010, with sharply rising world market prices, the equalisation mechanism in Burkina Faso initially prevented farmers from benefitting greatly from the increasing world market price, which gave farmers less incentive to grow more cotton during that time. In the 2012/13 season farmers will, however, benefit from the fund payments to stabilise a cotton purchase price higher than the world market price.

A simpler option, which was chosen by several WCA governments, was to directly subsidise the purchase price for cotton or fertiliser prices during phases with low world market cotton prices with budget funds. These were refinanced through donor funds.

Another way to assist farmers to cope with price fluctuation risks is to train them in basic commercial practices – if possible integrated with functional literacy programmes – so that they are capable of optimising their overall operations, which generally entail an average of four to five crops, vegetable farming and small scale trading and tradesmen activities. From a commercial perspective it could then make sense to reduce cotton planting during periods in which low prices are anticipated. However, since cotton is much more resistant to drought than corn, it is always sensible for farmers to grow at least a minimal amount of cotton as part of an adequate insurance strategy for securing their income against weather related risks.

3.5 The cultivation of cotton versus food crops

There is a vast discussion on the advantages and disadvantages of cash crop production vs. the production of food crops in literature. In general, opponents of cash crop production are concerned that cash crops compete with food crops for scarce land and that with increasing cash crop production farmers produce less food crops, which can lead to a rise of prices in local food markets (Jayne et al. 2004, 210; Kiriti / Tisdell 2003, 442). However, proponents of cash crops state that specific cash crop arrangements are able to establish access to inputs and thereby intensify food crop production and that, even without specific arrangements, food crop production benefits from cash crops through crop rotation and residual fertiliser of the cash crops in the soil (Brüntrup 1997; Govereh et al. 1999, 31; Govereh / Jayne 2003, 41; Demont / Stessens 2009, 260 ff.). Based on this discussion and the fact that most smallholder cotton farmers also produce food for their own consumption, it is important to examine whether cotton production favours food production or not, as well as which sector organisational model can best support food crop production and how.

In COMPACI countries cotton is generally grown under the practice of rainfed agriculture and in rotation with other crops. Therefore, food crops can benefit from residual fertilisers in all organisational models, but especially in countries where contract farming models that provide fertiliser for cotton exist, e.g. WCA countries. In fact, in many WCA countries cotton is the only agricultural value chain that can provide millions of farmers not only with fertiliser, but also with other inputs for agricultural production, as well as with investment goods like oxen and agricultural equipment. This also benefits the farmers' other crops, as fertiliser, pesticides, draught animals and equipment are also used for growing other crops. This is not possible in more competitive organisational models, where contract farming arrangements that pre-finance inputs cannot be maintained.

Due to this interdependency of cotton and food crop production in WCA, phases with low prices for cotton not only lead to a reduced production of cotton, but also to reduced food crop production in the cotton farming regions of WCA (Poulton et al. 2010, 6; Bellocq / Silve 2007, 5 f.). In this respect, it can be said that promoting cotton production also directly increases the security of the food supply in those countries.

When taking a closer look at the management of fertiliser loans, however, which are intended for the cultivation of cotton but also used for other crops, many problems can be observed. The fact that many farmers have given grossly exaggerated estimations of the surface area to be used for cotton cultivation during phases with low cotton prices in order to receive fertiliser and chemicals for other crops has proven to be very problematic. As a result, farmers who grow a lot of food crops and only little cotton during these phases were unable to pay back the input loans with cotton and accumulated considerable outstanding debts. The situation was further complicated through the practice of joint liability in the cooperative system, in which honest farmers were required to pay for the

"dishonest" debtors. As a result the accumulation of old debts took away all incentive for farmers to grow cotton, as they feared that a large portion of their earnings would be withheld for the payment of these debts. These mechanisms ultimately contributed to fuelling the crisis in the cotton sector and to an equal further reduction of both cotton and food crop production.

Based on this experience, three models for promoting the cultivation of both cotton and food crops without putting the farmers at risk of over indebtedness are being tested or already in place in some countries of WCA. The central idea for the cotton companies is to secure the loyalty of the farmers with a minimal level of cotton production even during phases of low cotton prices. Additionally, the practice of crop rotation has to be encouraged from an agronomical point of view, as it contributes to the preservation of soil fertility and to combat parasites.

(1) The Ivorian cotton company Ivoire Coton records all 40,000 contract farmers working with them in a detailed database that focuses on all land farmed by theses farmers for any crop. Ivoire Coton is able to use their knowledge of the yields and prices to gain relatively precise insight into their farmers' earnings and the cash costs, which result almost entirely from the inputs provided by Ivoire Coton. This allows Ivoire Coton to determine the debt capacity for each farmer and to adjust the delivered inputs (including amounts beyond that needed for cotton). In this respect Ivoire Coton is looking at the farmer's overall operations and not just the production of cotton. The farmers profit from the affordable prices and terms of payment that Ivoire Coton is able to obtain through international tenders for fertilisers and pesticides. Ivoire Coton did away with the policy of joint liability among farmers with the introduction of this system. Farmers who do not pay back their loans do not receive future loans. Debts are restructured in cases of weather-induced failed harvests.

(2) Sodecoton in Cameroon has a slightly different approach. They also provide inputs to farmers, but the fertilisers for cotton are charged differently than those for food crops (maize, sorghum). While the fertilisers for cotton are delivered without a down payment and are paid for through the delivery of cotton, the farmers must make a down payment of 30 per cent in cash for the fertilisers that will be used for food crops. Theoretically, the input credits for food crops will also be refunded by the revenues of those food crops or other revenue rather than coming from cotton in order to ease the burden on cotton, but this often does not work in practice. Therefore the amount of inputs given for food crops depends on the area under cotton cultivation and the precedent campaign's cotton yield per hectare. If the precedent campaign's productivity (kg/ha) of a specific farmer was under a defined threshold, no inputs for food crops will be given. In addition, for one hectare of cotton, a farmer can only obtain inputs for up to one hectare of sorghum or for 0.25 – 0.5 hectares of maize. The granted credits are group credits handed out to the cooperatives – if one farmer cannot pay back his credit the others will do so in his place. In contrast to Ivoire Coton, Sodecoton does not look into the farmers' debt ratio

under this system. However, Sodecton is also currently looking into changing from group to individual credits and taking the individual farmer's debt ratio into account.

(3) Another new development is seen in the parallel promotion of cotton and soy cultivation by some cotton companies (Sodecoton in Cameroon and, to a limited extent, DZL and Cargill in Zambia). This is a particularly meaningful practice for crop rotation, as soy returns the nitrogen to the soil that the cotton consumes. From an economic standpoint, this is particularly interesting for the cotton companies that also operate seed cotton crushing oil mills. They are then able to supply these mills with both cottonseed and soy. Under this model, soy, like cotton, is planted and harvested under contract farming. Since cooking oil is central to securing the food supply and the remaining oilcake a valuable animal feed, this is also an example of how the cultivation of cotton and food crops can be sensibly intertwined (Clavier 2010).

In general it can be said that a debate of "cash crops versus food crops" does not reflect a real alternative and does not really help in the search for solutions for smallholder African farmers. It is much more important to discuss ways of sensibly linking the promotion of cash crops for export with the cultivation of food crops for local markets and subsistence production. This also applies to other major African cash crops, namely palm oil, coffee and cocoa, all of which are primarily cultivated by smallholder farmers who always combine the production of cash crops with the production of food crops. The solutions that must be developed for combining cash crop and food crop promotion will, however, be sector-specific and vary as contract farming arrangements are less prevalent in the coffee and cacao sector.

3.6 Environmental and social standards in cotton farming

While the cultivation of coffee and the working conditions in the textile (sewing) companies have long been a topic in the public debates that have led to environmental and social standards, public awareness for the development of standards for cotton farming is a more recent phenomenon. Fair Trade cotton from Africa has been available since 2007, the Cotton made in Africa (CmiA) and Better Cotton Initiative (BCI) standards were both founded in 2005.[20] The production of organic cotton is the only standard with a significantly longer history. Although the world market share of all four of the above named standards is still small and well under 2 per cent, many major retailers have issued declarations of intent to completely switch to textiles that have been produced with sustainable cotton in the next five to eight years (Engel 2011, 12). Therefore, it is important to assess which form of cotton sector organisation is best prepared to implement environmental and social standards.

20 More information on Fair Trade cotton can be found at Fairtrade Foundation (2012), on BCI at BCI (2012) and on CmiA at CmiA (2012a).

While BCI, Fairtrade Labelling Organization (FLO) and bio cotton have been of little importance in Africa thus far,[21] CmiA was able to boast more than 483,180 verified farmers with a production of more than 176,400 tons of lint cotton in the 2011/12 cultivation period (AbTF 2012a).[22]

Those seeking to establish environmental and social standards for African cotton used to produce textiles for the mass market face the following challenges:

- The standard must be practical and build on the reality of the production conditions of hundreds of thousands of smallholder farmers and help to gradually improve these conditions.

- The standard must be credible and be able to withstand external scrutiny.

- The costs of verifying the standard must be reasonable in relation to the farmers' income. If an African farmer has an average net income of 232 EUR[23] per ha of cotton (see Figure 10), the verification costs per farmer cannot amount to 20-30 EUR.

- The development of standards cannot be an end in and of itself, but rather must be integrated in a process that allows for the living conditions of the cotton farmers to gradually improve.

The example of CmiA shows that contract farming arrangements, which are only possible in a concession or concentrated competition model, are most suitable for meeting these challenges. Accreditation to CmiA starts with a few key exclusion criteria (such as the worst forms of child labour or farming in nature reserves). A traffic light criteria system focusing on gradually improving the social and environmental criteria is an additional integral part of CmiA. Starting in 2013 CmiA will also allow surpluses from the licensing fee revenue to be invested in the cotton farming regions for the twofold purpose of improving the environmental effects of cotton production and to improve the living conditions of the farmers.[24] To ensure the efficiency of the verification system, the cotton companies, as contract partners, bear most of the responsibility for ensuring

21 BCI cotton was grown by app. 4,000 farmers in Mali in the 2010/2011 growing season (see Proforest Initiative 2011, 38). According to FLO-CERT, FLO cotton is grown in Burkina Faso, Mali, Senegal and Cameroon (see FLO-CERT 2011). According to the knowledge of the authors, Fair Trade cotton is currently only purchased from a few thousand farmers in Senegal. In the 2009/10 growing season 14,481 tons of bio cotton were grown by 31,069 farmers in the countries of Benin, Burkina Faso, Mali, Senegal, South Africa, Tanzania, Uganda and Zambia (see Truscott et al. 2010, 16 f.).

22 However, only approx. 5 per cent of this verified cotton is sold under the CmiA label at present (see Peltzer / Neubert 2011, 472). As CmiA cotton since is allowed to also be marketed under BCI May 2012, it profits from a strongly increasing demand for BCI cotton, which will most probably absorb 50 per cent of all verified CmiA cotton in the upcoming 2–3 years.

23 Here and in the following, net income refers to cotton income per ha in USD minus input costs (for seed, fertiliser, pesticides). Labour costs and any other costs are not included in the calculations. This figure refers to the 2010/2011 cultivation period.

24 A detailed portrayal of the CmiA criteria matrix can be found at: Aid by Trade Foundation (2012b) and at CmiA (2012b).

that the exclusion criteria are adhered to and that the performance criteria are fulfilled step-by-step. Under this system the cotton companies must clearly document the efforts made to improve the fulfilment of the criteria and prove that appropriate management plans are in place. On this basis the independent verifiers are generally able to determine if and to what degree the cotton company's claims are true based on interviews with a limited number of farmers.

One advantage in this approach of using cotton companies operating under contract farming is that it clearly defines actors of responsibility (change agents). During the selection process, cotton companies being considered as possible new partners for CmiA are assessed based on the degree to which they are willing and able to successfully manage the necessary change processes in cooperating with tens of thousands of smallholder farmers. If the verification process shows that certain criteria are not being met, the cotton companies must either improve in those areas or risk losing their CmiA verification.

Furthermore, relying on cotton companies with well established systems of contract farming allows for the cost-effective and widespread introduction of "new production" methods, which help improve the performance level under the CmiA criteria matrix. These methods might include the application of pesticides according to damage threshold principle (Integrated Pest Management [IPM]); the creation and use of compost pits; ground and water conservation techniques; the use of stonewalls to protect against erosion; the introduction of minimal tillage; switching from backpack sprayers (high water consumption) to Ulva sprayers (low water consumption) and the planting of nitrogen fixing cultures. The well-run cotton companies and their extension services are able to quickly and appropriately react to the problems that inevitably occur when "innovations" are introduced. For example, the introduction of minimal tillage in Zambia has been accompanied by a significant increase in weed growth. This technique will only find widespread acceptance among farmers if they are also provided with the herbicides needed to combat weed growth on a credit basis. Private cotton companies with a sufficient credit rating are able to react to such needs by the following season.

Unlike CmiA, FLO and BCI have thus far worked almost exclusively with farmers' organisations and local NGOs as partners in implementing their standards. As both the BCI and FLO farmers are contractually bound to the cotton companies, it is not uncommon that situations arise in which it is unclear who, i.e. the farmers organisation on field level, the implementing NGO or the cotton company, bears the responsibility for removing shortcomings or for the continuous improvement process every standard pursues. For this reason, Fair Trade and BCI are rethinking their approach so that the cotton companies in Africa will play a significantly greater role in implementing their respective standards criteria in the future.[25]

25 Discussions between the author Roger Peltzer with officials from BCI and FLO at the COMPACI and CmiA Stakeholder Conference in Livingstone / Zambia from 12–14 October 2011.

4 Conclusion: a comparison of organisational forms of the cotton sector

This paper showed that the cotton sector is an important part of agriculture in sub-Saharan Africa that offers good starting points for targeted policies for combating poverty, securing the food supply and for implementing environmentally-friendly farming methods. Different organisation models exist that offer different advantages and disadvantages, as was shown throughout Section 3.

Comparing the different models and their outcomes shows that there is no ideal system for organising the cotton sector that is systematically more suitable to meet all needs than an alternative model (Delpuche / Leblois 2011, 13 f.; Poulton et al. 2010, 7). However, models which allow for contract farming do meet most of the criteria that indicate a high performance.

The monopoly/concession model is inherently more prone to mismanagement and corruption, even when counterbalanced by strong farmers' associations. However, this model has shown some strength regarding the provision of agricultural inputs and price stability. Companies like Sodecoton in Cameroun and Sodefitex in Senegal are also the only one's which significantly invested in the maintenance of the seed quality over the last years. Contract farming arrangements that are organised under a monopolistic system in WCA also show that there are promising experiences in a productive connection between cash crops and food production and the introduction of environmental and social standards.

Countries that choose to use a concession model should, however, define clear performance indicators that must be met in order for licenses to be renewed.[26] This requires first and foremost that private and parastatal companies report publicly and transparently on their performance *(*number of contracted farmers, ha yields, gross profit/ha, production figures), something that has not often been the case.[27]

The concentrated competition model as practiced in Côte d'Ivoire and Zambia is becoming more important in sub-Saharan Africa. The better the state's definition of the rules in a system with co-regulation with the private sector and the better the state monitors adherence to the regulations or sanctions non-compliance, the sooner that system will be able to show its full strengths. For example, only gins that provide a minimal amount (to be defined) of advisory services and provide input pre-financing should be awarded a new license or the renewal of an existing license. Compliance with the terms of contract must be guaranteed and side selling prevented. The farmers would only be allowed to change partners, meaning cotton companies, after the season or after they have paid back investment

26 Situations rarely arise in which decisions can be made on issuing licenses to newcomers. When awarding licenses for set time periods, it would be logical to only lease the cotton gins "going along with the license" for set periods (such as five years). This allows more flexibility in issuing new licenses based on poor performance.

27 For example, the information policy of Sofitex (parastatal) in Burkina Faso, which is the largest cotton producer in sub-Saharan Africa along with the CMDT in Mali, has been not always very transparent in recent years.

loans, which may last for a period of several years. The contracts can be monitored with a uniform data file, in which all cotton companies enter their contracts with the farmers, which would also help prevent "double contracts" and "side-selling". Such a data base has been installed by all ginners in Zambia in 2011 and it already exists in Côte d'Ivoire. The improved cooperation between the parties in the cotton sector in Zambia is already leading companies like Dunavant and Cargill to slowly explore the expensive pre-financing of mineral fertiliser and the granting of investment loans to farmers. This should lead to a significant increase in the average harvest yields of Zambian cotton production once these developments can be consolidated. Such a partly private and partly state regulated system will be then also able to implement a productive cooperation between cash and food crops, as well as environmental and social standards.

The atomistic competition model shows massive deficits. This is due to the fact that it does not offer any opportunity for the farmers' productivity to be systematically increased through the provision of inputs or advisory services. Due to the very high pre-financing costs for genetically modified seed, the free competition model is also not suitable for introducing transgenic cotton. Sustainability standards like CmiA, BCI and Fair Trade are also very difficult to implement in a system with atomistic competition, as these standards require traceability and the implementation of their criteria by tens of thousands of farmers. This can only be done through cooperation with management partners who systematically and contractually register and support these masses of farmers.

Under the model with atomistic competition, the introduction of a tax (levy) on all cotton exports could be a feasible solution to dealing with part of the deficits. This tax could be used to give the inputs "free of charge" to the farmers. Such a model exists in Uganda. Such a tax was introduced in Malawi in the 2011/12 season. The disadvantages of a tax are that the farmers lose their incentive to use external production inputs efficiently, which they perceive as being offered for free. Since inputs are financed "invisibly" through the sector, the smallholder farmer has no way of understanding how much it costs to grow cotton (compared to growing other products) or how much profit he/she makes with cotton. This system also implies that inputs and agricultural advisory services must be provided or organised by the state. Past experiences leave room for significant doubt as to how efficient and transparent this can be done in SSA. The state must also make advance payments until the tax is fully functional and bear significant commercial risks should the forecasted cotton production figures not be realized. The Malawian government just realised that it will only recover 50 per cent of the pre-financing they provided for cotton inputs in 2011 with the levy cashed in 2012 (Socotec 2012).

Whatever the organisational model, the state can and should delegate many tasks to private parties, but the selection and monitoring of these parties must be subject to strict criteria and the state should be able to sanction those who do not provide the agreed services. In addition to government regulation, international standards such as CmiA, contribute to bringing cotton companies and farmers to cooperate with each other on an equal level. For example, the CmiA criteria catalogue contains requirements for the setting of purchase

and input prices, as well as the terms of payment for the farmers. Wide-reaching developmental impacts can thus be achieved in the cotton sector through the interaction of adequate regulation and international standards. Potential donor support should be structured to stimulate such interaction in the cotton sector.

In conclusion, Tschirley et al. (2010, 317 ff.) and Poulton et al. (2010, 7) can be supported in their statement that there is no one-size-fits-all solution regarding the optimal organisational form of the cotton sector. Those involved would instead be well advised to continue to develop further existing systems in an incremental way instead of experimenting with radical alternatives, as:

> *"... feasible reform paths depend on a country's previous experience. Attempted rapid change from an established system to one with dramatically different behavioral underpinnings, even if the new system holds the prospect of improved performance if "properly" implemented is a risky undertaking that could instead reduce performance for long periods".* (Poulton et al. 2010, 7)

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