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# Zambia

## Commercial Value Chains in Zambian Agriculture: Do Smallholders Benefit?

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**CURRENCY EQUIVALENTS**  
(Exchange rate effective 2009)

Currency unit = Zambia kwacha (K)  
K 4,900 = US\$1

**ABBREVIATIONS AND ACRONYMS**

ACF	Agricultural Consultative Forum
CAZ	Cotton Association Zambia
CCAA	Competitive Commercial Agriculture in Africa
CDT	Cotton Development Trust
CPI	Consumer Price Index
CSO	Central Statistical Office
d	Day
DoP	Division of Proceeds
DRC	Democratic Republic of Congo
ERC	Estimated Recoverable Crystals
EU	European Union
FOB	Free on Board
GAMS	Generalized Algebraic Marketing System
GDP	Gross Domestic Product
ha	Hectare
K	Zambian kwacha
KASCOL	Kaleya Smallholder Outgrower Scheme
KASFA	Kaleya Smallholder Farmers' Association
kg	Kilogram
KST	Kaleya Smallholder Trust
lb	Pound
m	Million
MACO	Ministry of Agriculture and Cooperatives
MCGA	Mazabuka Cane Growers Association
NATCO	National Tobacco Company
SA	South Africa
SACS	Smallholder Agricultural Commercialization Strategy
SACU	Southern African Customs Union
SADC	Southern Africa Development Community
SCRB	Soil Crop Research Branch
SNV	Netherlands Development Organization
t	Metric ton
TAZ	Tobacco Association of Zambia
TBZ	Tobacco Board of Zambia
TRB	Tobacco Research Board
UMDP	Urban Markets Development Program

US	United States
US\$	US dollar
VTAZ	Virginia Tobacco Association of Zambia
YIELD	Yield Improvement through Empowerment, Learning, and Discipline
ZACOPA	Zambia Cotton Outgrower Pre-financiers Association
ZAMSEM	Zambia Agriculture Spatial Equilibrium Model
ZCGA	Zambia Cotton Ginners Association
ZLTC	Zambia Leaf Tobacco Company
ZSC	Zambia Sugar Company
ZNFU	Zambia National Farmers' Union

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## EXECUTIVE SUMMARY

**1. The commercialization of small-scale agriculture is an important element in Zambia's strategy for equitable economic growth, but doubts persist about whether Zambian smallholders truly benefit from participating in value chains for commercial crops.** The common perception is that other participants in the value chain, such as middlemen, traders, and processors reap a greater share of the returns and that smallholders are being exploited. Another frequent assumption is that smallholders have to sacrifice the production of food crops to participate in the production of commercial crops.

**2. If these perceptions are true, the implications for Zambia's economy and growth strategy are serious.** Zambia's rural economy is dominated by smallholder agriculture, and the Zambian economy as a whole is sustained significantly by agriculture and agroprocessing, which account for more than 40 percent of GDP and contribute about 12 percent of export earnings. Agriculture employs about 67 percent of the labor force and supplies raw materials to agribusinesses, which account for some 84 percent of manufacturing value-added in the country.

**3. Today about 300,000 smallholders are linked to agribusinesses through more or less vertically integrated value chains.** Most of these smallholders work as contract farmers, especially for cotton, Burley tobacco, and sugarcane processors. In return for assuring their supplies of raw produce, these agribusinesses provide farmers with varying amounts of inputs and services, including not only marketing services but crop management knowledge and skills.

**4. An unbiased assessment of the benefits and costs of smallholders' participation in Zambia's value chains would help to determine whether it is worthwhile to support their participation.** Perceptions of exploitation undermine trust and cooperation among value chain participants, preventing them from pursuing market opportunities. A persistent negative attitude towards the private sector also reduces the commitment to reforms that would increase investments and raise growth rates.

**5. This study addresses those concerns. It provides an evidence-based analysis of specific benefits and constraints associated with smallholders' integration into the commercial value chains for cotton, Burley tobacco, sugar, and domestic horticultural crops.** These particular value chains were selected for the analysis because of the numbers of smallholders involved and the contrasting links between small-scale farmers and agribusiness. Cotton and tobacco are the two main commercial crops grown by smallholders. Sugar provides an example of extremely close collaboration between smallholders and agribusiness within a vertically integrated value chain. In contrast, the value chain for domestically marketed horticultural crops encompasses the largest number of smallholders, but their links to agribusiness are quite weak.

**6. Smallholders—contrary to common perceptions—benefit considerably from increased participation in value chains.** The conclusion that smallholders are among

the major beneficiaries in commercial value chains is based on the costs and profits accruing to individual participants at each segment of the value chains and the nonmonetary benefits received by smallholders.

**7. Under all yield assumptions, smallholder farmers exhibit healthy returns on their participation in these value chains. Returns to family labor are positive for all four chains** (see tables). Sugarcane farmers earn exceptionally high returns to family labor, probably because of the good local growing conditions, the industry's general profitability, and the way that smallholders are organized under the outgrower scheme. Returns to family labor for cotton, tobacco, and horticulture are also very good, considering that the wage rate for rural casual labor is about US\$1.20 per day and that smallholders rarely have the opportunity to sell their labor at the full wage rate every day of the year.

**Benefits to smallholders participating in Zambia's cotton, sugar, and tobacco value chains**

Value chain	Indicator	Benefits at low yields	Benefits at medium yields	Benefits at high yields
Cotton	Return to family labor (US\$/d)	0.65	1.71	2.77
Burley tobacco	Return to family labor (US\$/d)	0.68	2.44	3.32
Sugar	Return to family labor (US\$/d)	134	183	204

Source: Study team calculations

**Benefits to smallholders participating in the domestic horticulture value chain**

	Tomato production	Watermelon production and trade
Return to family labor (US\$/d)	1.94	5.99

Source: Study team calculations

**8. Zambia is a competitive producer of cotton and tobacco for export.** Even so, a sensitivity analysis using different exchange rates suggests that although the profitability of cotton and tobacco is generally robust, the trade advantage could evaporate if the Zambian kwacha appreciates significantly (that is, to levels higher than K 3,500 : US\$1.0). In the sugar industry, as trade rules change, profit margins may have to be reduced to improve international competitiveness.

**9. Farmers do not have to abandon food crop production to participate in value chains for commercial crops.** No trade-off exists between cash crops and food crops. Despite the enduring notion to the contrary, farmers seem well aware that maize can be grown in rotation with cotton, tobacco, and horticultural crops, depending on levels of soil moisture and rainfall, which in Zambia are usually sufficient. Most smallholders in the farming systems examined for this study practiced such rotations. In some instances, inputs supplied to produce commercial crops, especially fertilizer, are beneficial for subsequent food crops. Commercial crops also provide much-needed cash to invest in human and physical capital.

**10. The nonmonetary benefits that smallholders gain from value chains are critical, not only for the success of the value chains but for maintaining farmers' knowledge and skills.** Sugar producers—who are in a highly managed relationship with the monopsonist Zambia Sugar Company—receive the highest level of nonmonetary benefits, but the cotton and tobacco industries also invest heavily in supplying extension services and inputs to the smallholders in their outgrower schemes. Dunavant, the main cotton company in Zambia, has initiated a successful extension program aimed at raising farmers' yields. The cost of managing these schemes represents 8 percent of the costs of cotton processors and 14 percent of the costs of tobacco processors. In contrast, smallholders growing horticultural crops for the domestic market receive no services, owing to their weak links with agribusiness.

**11. Targeted public investments in developing value chains and outgrower schemes would greatly support the government's strategy for equitable growth and agricultural diversification through smallholders' greater participation in commercial agriculture.** The levels of monetary and nonmonetary benefits that smallholders receive from participating in commercial value chains indicate that Zambia has a major opportunity to move forward with this strategy.

**12. Moving forward will require a number of steps by the public and private sector to further develop value chains, improve their performance, and sustain and increase the benefits going to farmers:**

- ***Effective coordination among value chain participants depends on private sector initiatives, but the public sector can contribute by maintaining a transparent and stable policy environment, supporting effective regulation to promote competition, supporting better access to market and price information, and actively promoting market linkages.*** A significant step in this direction would be to complete and enact revisions to the Markets Act and Cotton Act. The trading environment, market transparency, and value chain coordination are all likely to improve as a result. Coordination along the tobacco chain could be improved by a careful review of the responsibilities, capacity, and funding of the Tobacco Board and Tobacco Association, with the aim of providing better services to the sector.
- ***Without public and private sector alliances for effective contract enforcement, outgrower schemes will not be sustainable.*** Weak contract enforcement is the single most important constraint for almost all of Zambia's commercially oriented smallholders and the value chains in which they participate. Side-selling and side-buying threaten the profitability of the entire value chains for cotton and tobacco. It is critical that all stakeholders work together to solve this problem. Any solution will require efforts from all chain participants and the public sector. The Government of Zambia needs to ensure that commercial disputes in rural areas can be resolved effectively in a timely and affordable fashion. A better local system must be developed for sanctioning contract-breakers. It is also essential to increase smallholders' awareness of the consequences of side-selling. Aside from public efforts to improve contract enforcement, cotton and tobacco firms can alter their

contracting procedures to ensure that sanctions are necessary only in rare cases. For example, firms can invest in management information systems to monitor farmers more effectively, ensure that contracts are worded to increase informed consent among all parties (especially farmers) with respect to their rights and obligations, and improve coordination among all stakeholders through the institutions that have been created for this purpose.

- ***Public–private partnerships in extension could improve the performance of value chains and increase benefits going to smallholders.*** Private efforts to transfer knowledge and skills to smallholders have been effective and offer lessons for future efforts to strengthen value chains. Considerable returns could be gained from public–private partnerships to support extension in particular value chains. For example, a one-off training for all 300,000 cotton and tobacco farmers in better farming practices and improved technologies would cost US\$6.13 million. Real farm income benefits across the board would be US\$7.2 million per year. Even if these benefits should prove transient and evaporate after five years, the internal rate of return on this extension effort would be 112 percent—which is a significant return on any investment in farm productivity.
- ***Public investments in developing value chains will differ over the near and long term.*** In the near term, the public sector should focus on strengthening value chains as indicated above. In the medium to longer term, investments in transport, energy, and telecommunications should be targeted at the rural areas with the highest potential for agricultural growth. Such investments are widely recognized as essential for generating new economic opportunities in agriculture and agribusiness, facilitating value chain development, and increasing the number of smallholders who participate in value chains.

# 1. INTRODUCTION

Agriculture and agroprocessing are important in Zambia's economy, representing more than 40 percent of gross domestic product (GDP) and contributing about 12 percent of national export earnings. Agriculture employs some 67 percent of the labor force and supplies raw materials to agricultural industries, which account for some 84 percent of manufacturing value-added in the country.

Smallholder agriculture dominates the rural economy. It provides livelihoods for the overwhelming majority of rural households. The commercialization of smallholder agriculture is an important element of Zambia's strategy to increase economic growth in an equitable manner and diversify smallholder agriculture.

For many years, the government supported agriculture by providing farmers with services such as extension, credit, and market outlets, but the government withdrew from these activities following the reforms of the 1990s. Since then the private sector has driven changes in agricultural production patterns, technology adoption, and the mix of enterprises, with some impressive results. Between 1990 and 1994, agricultural exports doubled from US\$30 million to US\$61 million; by 2006, they had reached US\$300 million. Zambia's main agricultural exports are cotton, tobacco, and sugar, which together represent about two-third of agricultural exports. Between 2000 and 2006, cotton exports grew at an average rate of 31 percent, tobacco exports grew by 29 percent, and sugar exports grew by 19 percent.

Today about 300,000 smallholders are linked to agribusinesses through value chains that are more or less vertically integrated, depending on the crop. The majority of these smallholders participate in contract farming schemes for tobacco, cotton, and sugar; under these schemes, farmers receive inputs and market their output through the agribusiness. They also learn new farming techniques and management skills. In return, agribusinesses secure raw produce for their value-adding activities. Many of the current arrangements are very similar to the relationships smallholders had with the government in the past.

Yet Zambians are concerned that these arrangements may not benefit all participants and that the benefits may not be distributed fairly along the value chains. It is commonly asserted that smallholders do not benefit from participating in value chains because middlemen in the value chains, such as traders and processors, obtain higher returns than farmers, which is perceived as unfair. This assertion echoes the widespread perception that earlier economic reforms benefited mainly foreigners and left Zambians increasingly poor.

These concerns are important for many reasons, not the least of which is that smallholders and other stakeholders will be reluctant to participate in value chains without a clear, unbiased assessment of the expected gains. Frequent complaints about exploitation and a high level of mistrust prevent stakeholders from working together effectively to take advantage of market opportunities. Persistent negative attitudes towards the private sector reduce the commitment to reforms that might otherwise increase investments and raise growth rates.

This study therefore asks: “Do Zambian smallholders benefit from greater participation in value chains?” It provides an evidence-based analysis of the benefits and constraints associated with smallholders’ integration into specific commercial value chains. The study also investigates whether the benefits of participating in these value chains can be increased for smallholders and provides corresponding policy and investment recommendations.

The cotton, Burley tobacco, sugar, and domestic horticulture value chains were selected for the analysis because of the numbers of smallholders involved and the contrasting linkages between small-scale farmers and agribusiness. Cotton and tobacco are the two main commercial crops grown by smallholders. Sugar provides an interesting example of extremely close collaboration between smallholders and agribusiness within a vertically integrated value chain. In contrast, domestic horticulture includes the largest number of smallholders, but their links to agribusiness are very weak.

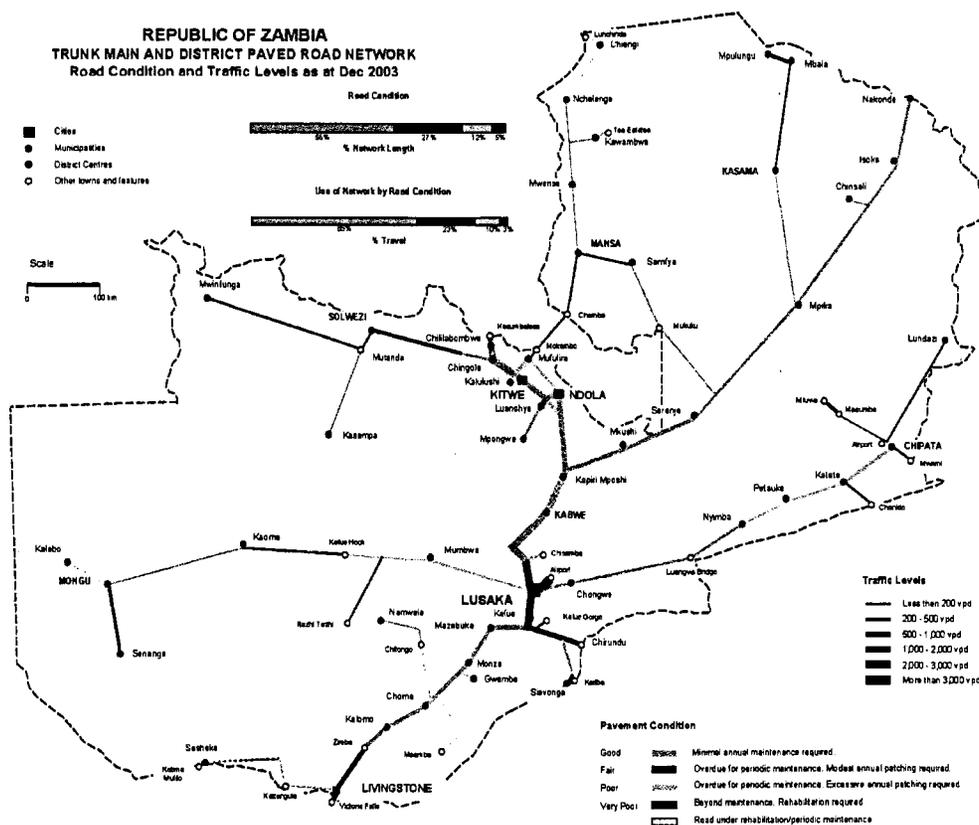
A participatory approach was adopted for this study. In March 2007, a stakeholder workshop, hosted by the Agricultural Consultative Forum (ACF) and opened by the Ministry of Agriculture and Cooperatives (MACO), launched the study and provided a forum for discussing its design. In October 2007, ACF hosted a second workshop to verify and discuss preliminary results after the field research. The workshop made it possible to address common misperceptions of recent developments in cotton and tobacco, gain input from agribusinesses to compile full data sets on costs and margins for each value chain, and develop concrete proposals for interventions to improve the performance of each value chain.

The following chapter reviews the salient features of Zambian agriculture for the crops in question and provides an introduction to each value chain. Chapter 3 describes the methodology. Results are presented in Chapters 4 and 5, followed by conclusions in Chapter 6. Commodity-specific results are contained in the Annexes.

## **2. AGRICULTURE IN ZAMBIA**

Zambia is a landlocked country endowed with abundant natural resources for agriculture. Although 58 percent of the land in Zambia (75 million hectares) is classified as having medium to high potential for agriculture, only about 14 percent of arable land is cultivated. About 40 percent of cultivated area is planted to maize, the dominant crop, which accounts for about 40 percent of agricultural GDP. Maize, with cassava, accounts for about 75 percent of Zambia’s crop production.

Zambia has a center–periphery structure. Southern, Central, Lusaka, Eastern, and Copperbelt Provinces, with their core urban markets (Ndola, Kabwe, Lusaka, and Livingstone), are Zambia’s agricultural heartland. These provinces yield about 80 percent of domestic food production and a large share of Zambia’s major agricultural export crops, particularly cotton, tobacco, and sugar. These provinces are crossed by the main transport corridors and are consequently better connected and serviced by private operators (Map 1).



**Map 1: Zambia's road network, 2003**

Source: National Road Fund Agency; available at: <http://www.nrfa.org.zm/index.html>

According to the Crop Forecast Survey 2007/08, 1,145,829 smallholder households grow crops in Zambia. Of these, 96 percent are classified as small-scale farmers (with holdings of 5 hectares or less); the rest are medium-scale farmers (with holdings of 5–20 hectares). From 2000 to 2008, the proportion of small-scale to medium-scale holdings did not change significantly. Zambia also has about 1,500 large-scale commercial farmers.

The 1.1 million smallholders are very heterogeneous. About one-quarter consist of very poor, vulnerable households suffering chronic food insecurity and requiring long-term social protection. A second group includes very poor households with the potential to achieve sustainable livelihoods; these households market small surpluses in years with reasonable rainfall. About one-third of the small-scale farmers are commercially oriented. They are generally better educated than the other smallholders, possess more labor and land per capita, allocate a larger share of labor and land to cash crop production, and generally live in the agricultural heartland.

Commercially oriented smallholders face considerable constraints, including the low productivity of their production models and factors that limit the profitability of the commodities they produce, including financing costs, poor access to credit, poor transport infrastructure, a weak regulatory environment, and exchange rate volatility.

Zambia experienced unprecedented exchange rate appreciation during most of 2005 and the first half of 2006. During this period, the exchange rate for the Zambian kwacha (K) relative to the US dollar (US\$) appreciated from around K 5,000 : US\$1.00 at the start of 2005 to K 2,800 : US\$1.00 in April 2006. The appreciating kwacha was widely regarded as having reduced the competitiveness of several important export industries, including tobacco and cotton, since labor and other domestic costs still had to be paid at the same kwacha prices, but exports earned less local currency in foreign markets. The reduced value of agricultural exports was partly offset by a reduction in the costs of some inputs that were imported or quoted in foreign exchange. For each particular enterprise, the overall effect of the revaluation on competitiveness depended on the timing of input purchases and crop procurement as well as the extent to which the enterprise was dependent upon kwacha-based expenses.

Many smallholders are also affected by poor access to extension services. Agricultural services are provided through MACO, donor-funded projects, nongovernmental organizations, churches, and the private sector. The quality and availability of extension provided by MACO has greatly declined since reforms were introduced in 1991, largely because of budget cuts. Although MACO extension workers are based in the villages, farmers report that they do not provide any extension services to enhance production, do not serve as good models in the community, or do not visit farmers as they did in the past. In some cases, extension workers ask farmers to buy fuel to visit their fields—an expense beyond the means of most farmers. For the most part, farmers have abandoned efforts to obtain extension services from the government. Data from a survey conducted by INESOR (2005) show that about 77 percent of farmers interviewed never had access to government extension services (Table I).

**Table 1: Farmers' access to extension services, by service provider**

Service provider	Very often	Often	Rarely	Never	NA
Government agricultural extension officer	5.3	7.4	10.6	76.7	
Private extension officer	2.3	33.0	37.5	27.3	
Government veterinary officer			1.3	88.0	10.7
Private veterinary officer				86.6	11.4

Source: INESOR 2005

Note: NA = Not applicable

A general framework for smallholder commercialization is provided by the Zambia Smallholder Agriculture Commercialization Strategy (SACS) (World Bank 2006), which contends that smallholder agriculture has the potential to increase economic growth and reduce poverty in Zambia, primarily because land is plentiful and production costs are low. Even so, the SACS emphasizes the need to be realistic about smallholders' potential to increase their commercial orientation in the short and medium term. Smallholders differ greatly in their access to the assets required for commercialization, such as land and labor, human and social capital, and physical and financial assets. Nor can most smallholders independently capture the economic opportunities associated with better access to global value chains. Stronger linkages must be established between smallholders and agribusiness if smallholders are to take advantage of such opportunities. The SACS recognizes the role of outgrower (contract farming) schemes in commercializing smallholder agriculture but sees little scope for expanding them, because most commercially viable smallholders in high-potential agricultural areas have already joined such schemes. In the longer term, new economic opportunities and value chains are most likely to be developed through investments in transport, energy, and telecommunications targeted to rural areas with the highest potential for agricultural growth.

## COTTON

Cotton is produced almost entirely by small-scale farmers and contributes significantly to agricultural GDP (about 20 percent) and employment. In 2005, every third smallholder household in Zambia sold seed cotton ("seed cotton" refers to the harvested cotton bolls that have not yet been ginned to separate the cotton lint from the seeds). These households produced a gross value of exports of US\$71.8 million (in 2006), which accounted for 32 percent of the value of Zambia's main agricultural exports.

Average yields, at about 800 kilograms per hectare, are considerably below yields of 1,200 kilograms per hectare or more achieved by smallholders elsewhere in Africa and only 20 percent of the potential yields of the varieties used. Because the government has taken a very strong stance against genetically modified organisms, farmers do not grow Bt cotton and other genetically modified varieties.

All smallholders producing cotton are linked to the cotton value chain under outgrower arrangements. As noted, the basic principle of outgrower schemes is that a private company provides farmers with inputs (seed, chemicals) and technical support in exchange for their output (seed cotton). The company also provides marketing services, including picking and packaging material and transport logistics.

The main cotton company in Zambia, Dunavant, initiated the YIELD program (Yield Improvement through Empowerment, Learning, and Discipline) to improve average yields (Dunavant 2005, 2007). The program focuses on the “five basic nonnegotiables” of cotton production: (i) early and proper land preparation, (ii) timely planting, (iii) correct and properly spaced plant population, (iv) keeping the crop weed free, and (v) wise pest management. The program uses proven and advanced extension and training methods to create a critical mass of smallholders who can sustainably improve cotton yields, earn higher incomes, and thus continue to profit despite declining world prices for cotton lint.

A one-year pilot of the YIELD program in 2004/05 indicated that farmers could improve cotton yields by more than 100 percent. With such training, the majority of “traditional” farmers, who obtain seed cotton yields of slightly less than 600 kilograms per hectare, could shift into the “better” and then “committed” farmer categories and continue growing cotton because of the profits (van Gent 2007).

## **BURLEY TOBACCO**

Zambia’s agroecological conditions are well suited to tobacco production. Not surprisingly, Zambia has a strong tradition in tobacco exports. Tobacco was grown successfully before independence and continued to be a mainstay of agricultural exports and rural employment until the mid-1980s. Tobacco exports then declined—falling to less than US\$5 million in 1995—and Zimbabwe and, to a lesser degree, Malawi became the region’s dominant producers. Since the mid-1990s, when considerable efforts were made to promote tobacco production, Zambia has seen a significant revival of the crop.

Tobacco production has grown rapidly in recent years, especially between 2001 and 2004. Figure 1 shows production trends for the two major types of tobacco grown in Zambia, Virginia and Burley.<sup>1</sup> Key informants indicated that sharp increases in the 2002/03 and 2003/04 production seasons coincided with the arrival of farmers from Zimbabwe, but production now seems to have stabilized.

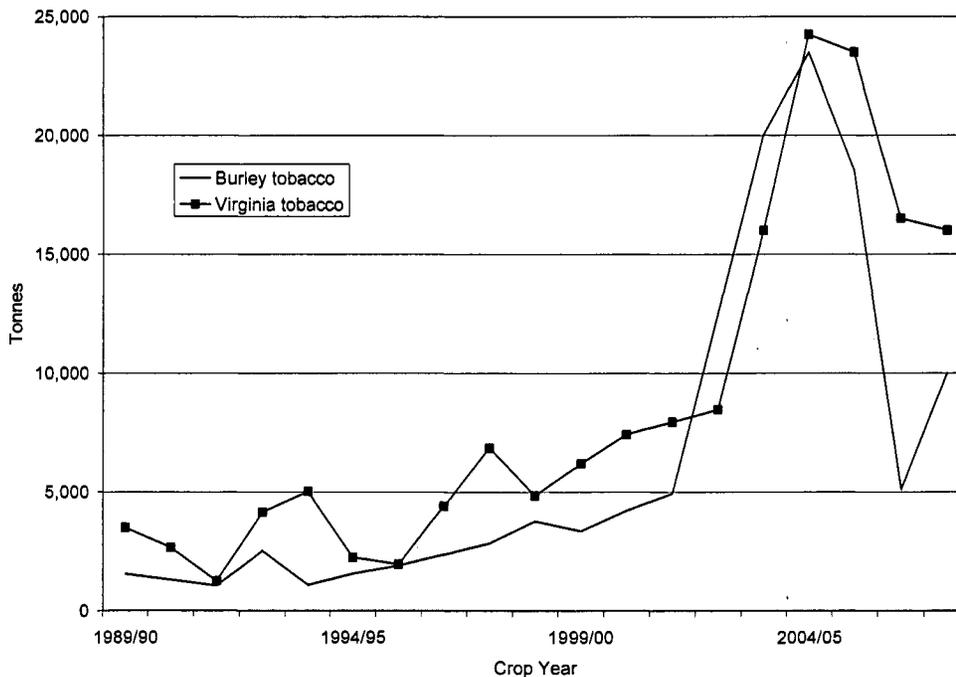
Burley tobacco is the second largest smallholder crop in Zambia; national average yields are 0.95 metric tons per hectare. As with cotton, tobacco farmers are linked to agribusiness through contract farming. The estimated number of smallholders growing Burley tobacco dropped from 20,000 in 2005/06 to around 9,000 in 2006/07. Low prices in 2005/06, resulting from the appreciating kwacha, caused substantial numbers of smallholders to abandon tobacco. Production fell to 22,200 tons in 2006/07 (see section 4

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<sup>1</sup> The sector’s rapid expansion is not fully captured in the statistics available at the time of the study, which presented substantial discrepancies. Despite uncertainties about actual production levels, it is nevertheless clear that total tobacco production peaked in 2004/05.

for a discussion of the impacts of exchange rate movements on competitiveness). Following the production shortfall of 2006/07, prices rebounded. Total production for 2007/08 was forecast to increase slightly, to 26,850 tons.

**Figure 1: Tobacco production (tons of unprocessed leaf), Zambia, 1989–2008**



*Source:* Based on unpublished data from the Central Statistical Office (CSO), Zambia, 1989–2004 and Zambia Leaf 2005–08 (forecast)

## SUGARCANE

Certain areas of Zambia are ideally suited for sugarcane production, and by world standards Zambia enjoys very high sugarcane yields. An important element of sugarcane production is that yields vary over the years as the crop regenerates. Yields can be as high as 170 tons per hectare in the initial years but drop over the longer term (10 years) to an average of 105–110 tons per hectare.

The sugar industry has been one of Zambia’s most successful nontraditional export sectors. Sugar exports stood at around US\$25 million annually in the mid-1990s but nearly doubled in value over the subsequent decade to generate almost US\$45 million in gross export revenues annually (about 4 percent of total merchandise exports) (Keyser and van Gent 2007).

In 2009, Zambian sugar’s preferential access to the European Union (EU) market will end. As price protection and volume restrictions are lifted, Zambia’s pricing structure will

change. Although growth in Zambia's sugar industry was constrained by the EU quotas, the new trade policy permits Zambia to export a maximum of 250,000 tons of refined sugar (about 95 percent of its current production) to the EU from 2009 until at least 2015. This change represents a significant challenge for Zambia, not least because the new policy is expected to reduce prices by 32.5 percent compared to the old protected price, but also because of the vast development opportunity it offers.

More than 80 percent of the sugarcane produced in Zambia comes from the Zambia Sugar Company's (ZSC) estate of 10,500 hectares at Nakambala. Cane is also supplied to ZSC by the Kaleya Smallholder Outgrower Scheme (KASCOL), which is managed centrally as an extension of the ZSC estate. KASCOL was formed in 1980 to produce cane for sale to ZSC by involving and developing smallholder growers.<sup>2</sup> KASCOL occupies 2,197 hectares—a core estate of 1,130 hectares and 1,067 hectares leased to 161 smallholders. The smallholders have an average of 6.5 hectares of cane each and receive an extensive range of services.

Because the smallholders lease their land from the estate, they cannot convert it to other uses, and there is limited opportunity for additional smallholders to participate in the scheme. The participating smallholders are no more than 30 kilometers from the ZSC processing plant at Nakambala. It is not normally viable to transport raw cane beyond this distance, because it must be delivered to the plant within 48 hours after cutting. The closest alternative factory is approximately 170 kilometers away, making ZSC the only option for cane growers in the Nakambala area. The only service provided by ZSC to KASCOL is irrigation, on the condition that the sugarcane is sold to them.

The sugarcane outgrower example is particularly interesting because of its historical and production-specific circumstances. KASCOL, smallholder farmers, and ZSC are in a symbiotic relationship to which there is no real alternative. It is indicative of the attractiveness of the enterprise that only 4 of the 165 original farmers in the scheme have left; none of these departures were voluntary.

## **DOMESTIC HORTICULTURE**

With elevations ranging from 1,200 to 1,800 meters and a southerly latitude, Zambia has good potential to grow high-quality horticultural crops (vegetables and fruits) for the domestic and export markets. Common vegetables grown for domestic markets are tomatoes, cabbages, rape, pumpkins, green beans, potatoes, onions, garlic, okra, eggplant, green maize, carrots, chilies, and spinach. Domestic produce is often seasonal owing to the general lack of irrigation.

The average aggregate vegetable yield (FAOSTAT 2007) is slightly less than 7 tons per hectare. This value seems rather conservative compared to aggregate average vegetable yields for other countries and average yields for specific vegetable crops in Zambia.

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<sup>2</sup> KASCOL holds a 99-year lease on the core estate and outgrower land. The smallholders sublease their land for 14 years, and the sublease cannot be transferred. To avoid dividing the leased land, the head of the outgrower household must make a will identifying one person who will continue the tenancy.

Using the FAOSTAT average yield for all the provinces of Zambia, it is possible to generate an indicative value for the total area planted to vegetables and the average area planted to vegetables per household. The national average vegetable area per household is about 0.1 hectare.<sup>3</sup>

While much is known about the successes and failures of export horticulture in Zambia, much less is known about the performance of the domestic horticultural system. Yet domestic horticulture is much larger and involves many more people than the export sector. Compared to growing vegetables for export, growing vegetables for the domestic market offers far greater scope for smallholder participation. Smallholders already account for a considerable share of vegetable produce traded in Lusaka at Soweto Market and other domestic outlets.

The study team generated baseline production, marketing, and consumption figures at the provincial level from a wide range of sources.<sup>4</sup> This research suggests that nationwide approximately 500,000 smallholder households produce vegetables (primarily tomatoes, cabbage, rape, and onions), of which only 170,000 sell surplus production with a value exceeding US\$100 per year. Only about 16 percent of all farming households are estimated to be involved in vegetable sales, compared to about 70 percent in Kenya and 25 percent in Mozambique.

Zambia's national production is likely to be on the order of 450,000 tons. The marketed volume in Zambia is estimated at around 27 percent of total production, with a total value of approximately K 72,000 million in 2004. Urban and periurban production is believed to be significant, as vegetable production is concentrated around urban areas or within 50–100 kilometers of the main processing and storage facilities. This pattern suggests that smallholders would respond quite substantially to new demand points for vegetables if they could be effectively linked to them. These links could be especially important for fruit, much of which likely now goes to waste for lack of markets.

In the Livingstone branch of Shoprite, the turnover for fruits and vegetables was claimed to be K 120 million per month, with an average daily turnover of K 4 million. Shoprite's policy is to obtain at least 60 percent of the products it sells from local sources. This policy applies to grocery items as a whole and might not apply to each item separately. If this policy were applied to fruits and vegetables, then just in the Livingstone store the yearly turnover of Zambian-sourced fruits and vegetables could be K 864 million (US\$216,000). Assuming that each of the 18 Shoprite branches averages the same as the Livingstone branch, the potential turnover for domestically sourced fruits and vegetables would be US\$4 million per year.

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<sup>3</sup> Hichaambwa and Tschirley (2006) identified 10 large farms around Lusaka supplying fresh produce, including Evergreen, Faro, CJ, Lilayi, Ellensdale, and Buya Bamba. They produce mostly tomatoes, onions, and cabbage. Most of the produce is sold in Soweto Market and at supermarkets. The areas cultivated range from 4 to 500 hectares.

<sup>4</sup> Most of the vegetable statistics presented in this study correspond to the aggregate "vegetable" category and not to individual vegetable crops. Clearly this is a composite of numerous vegetable crops.

### **3. APPROACH AND METHODOLOGY**

This study takes several approaches to determining whether smallholders benefit from participating in value chains and whether these benefits can be increased.

The potential of agricultural value chains to benefit smallholders depends to a great extent on the competitiveness of the chains, the kinds of benefits that smallholders can expect, and the extent to which smallholders can participate. The analysis begins with an assessment of the overall international and regional competitiveness of value chains for the internationally traded commodities in the study (cotton, tobacco, and sugar). The monetary and nonmonetary benefits of participating in value chains are examined as well. Monetary benefits are assessed through a quantitative value chain analysis, which presents a snapshot of the situation in 2007. The analysis of nonmonetary benefits (such as agricultural inputs and services) is forward looking and focuses on the potential for innovation and positive change in each value chain. Qualitative value chain analysis is used to examine the dynamic linkages between chain participants.

The Zambia Agriculture Spatial Equilibrium Model (ZAMSEM) was further developed to examine cross-cutting policy and investment recommendations derived from the value chain analysis. The model simulates the impact of two types of policy interventions: policies to enhance farm productivity and policies to strengthen value chains.

This study made use of as much information as possible. One particularly pertinent source was the World Bank study on Competitive Commercial Agriculture in Africa (CCAA); the quantitative value chain analyses of cotton and sugar in the CCAA's "Zambia Competitiveness Report" (Keyser with van Gent 2007) were used and updated for this study. Hichaambwa and Tschirley (2006) provided background for analyzing domestic horticulture. No prior analysis of the Burley tobacco value chain was available; this study presents the first one.

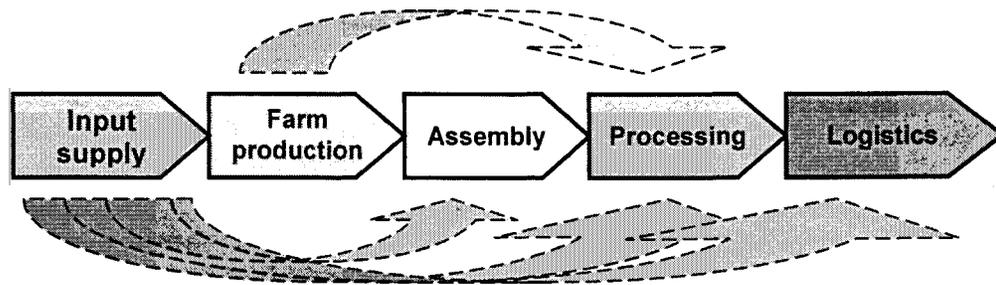
The study team conducted six weeks of fieldwork in Lusaka, Central, Eastern, Southern, and Copperbelt Provinces. They conducted interviews with key informants, including industry stakeholders; held focus group discussions with farmers in each value chain; and conducted surveys of wholesale markets. Numerous sources of information were used for verification and triangulation. As mentioned, preliminary results of the field research were shared and verified with industry stakeholders, including farmer representatives and researchers, at a workshop in Lusaka.

### **VALUE CHAIN ANALYSIS**

Value chains consist of different producers and marketing companies that work within their respective businesses to pursue one or more shared end-markets. Value chains therefore span all of the factors of production (such as land, labor, capital, technology, and inputs) and all of the economic activities (such as input supply, production, transformation, handling, transport, marketing, and distribution) necessary to create, sell, and deliver a product to its final place of international competition.

The main stages of an agricultural value chain are illustrated in Figure 2. In the figure, dashed arrows flow from input supply to all other stages to show that input supply is a crosscutting function that affects all participants, not just those at the farm level. The dashed arrow from farm production to processing shows that some farmers may deliver their crop directly to a factory, thereby fulfilling the assembly function as well. Direct delivery can occur through a vertically integrated supply chain managed by a large company, or it can occur because of the scale of a farmer's production or the farmer's proximity to the factory.

**Figure 2: Stages of the value chain**



Source: Study team

Actors along a value chain often move beyond spot market transactions to establish relations with each other through contracts, vertical integration, alliances, and other forms of coordination. These relations can cover a multitude of arrangements for production, processing, and logistics. The benefits that are usually sought from stronger linkages include improved access to inputs, technology, information, markets, and capital.<sup>5</sup> The strength of relations within the value chain is determined by the trade-off between the economic incentives associated with stronger relationships and the costs of losing independence.

### **Chain governance**

This study maps the actors along each value chain, identifies the dynamic linkages between them, and identifies external relations that impinge on the chain's performance. This analysis is vital for assessing whether chain participants can work together effectively to take advantage of market opportunities.

The broad concept of *governance* describes the quality of value chain linkages. Governance describes the extent to which interactions between chain participants are organized rather than simply random. Generally speaking, governance occurs when some

<sup>5</sup> For an exhaustive treatment of value chain analysis and development, see World Bank (2007).

actors in the chain work to parameters set by others.<sup>6</sup> Three dimensions of governance are examined here: (i) chain organization, (ii) institutions, and (iii) legislation and regulation.

- **Chain organization** describes how chain participants are linked to each other (vertically and horizontally) and whether these links are mutually beneficial. In particular, it encompasses the ways farmers are linked to agribusiness, how information and services flow along the chain, and pricing mechanisms. Based on these indicators, chains are ranked with respect to the strength of their inner linkages.
- **Institutions** bring different actors together along the chain. Because institutions serve as links between chain participants and outsiders (that is, government), they are neither completely internal nor external to the chain. Their effectiveness affects the capacity of the value chain to innovate and positively influence its business environment.
- **Legislation and regulation** determine how governance external to the chain affects its performance. This aspect of governance encompasses chain-specific acts and laws as well as general public sector interventions relevant to the development of value chains.

### Costs and returns along the value chain

The quantitative value chain analysis is constructed around enterprise budgets. These budgets take into account the total cost of all factors used in the production and marketing of each agricultural commodity, including labor, land, inputs, and capital. Some general cost categories are described below. A detailed list of costs occurring along the value chains is given in the Annexes.

Although the results of the quantitative value chain analysis can only approximate actual profitability, this approach is particularly useful for answering the central questions in this study, because it provides a detailed breakdown of the private costs and profits accruing to individual participants at each segment of the chain. (Actual cost structures vary from case to case, and this approach is not designed to substitute for individual investment planning or cash flow analysis.) The main indicators reported on are:

- Net profit = revenues – total cost.
- Profit margin = net profit/sales price.<sup>7</sup>
- Return to family labor = net profit/number of days of family labor input.

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<sup>6</sup> Gereffi, Humphrey, and Sturgeon (2005) present an analytical framework based upon the costs of coordination to identify and explain different ways in which value chains are structured to deliver effective governance.

<sup>7</sup> The sale price at the farm level is the farm-gate price. The sale price at the processor/trader level is the FOB/market price.

In addition to assessing profitability for each participant, the value chain approach can be used to determine the total value of each crop, which is used as a measure of competitiveness. The total value of the crop is the total cost of bringing the crop to the final destination (sale point: factory gate). For each exported commodity, international competitiveness is determined by comparing the value of the crop at the sale point with a benchmark parity price (domestic FOB price). If the value of the crop is lower than the FOB price, then the value chain may be said to be internationally competitive; if the value of the crop is higher than the FOB price, the value chain is not competitive.

Unless noted, all prices, tax rates, parity price calculations, and other values are based on conditions that prevailed during the 2007 agricultural season. At the farm level, private costs and returns are measured per hectare and per ton; at later stages of the value chain, values are measured per ton only. A rate of K 4,285 = US\$1.00 (which prevailed in March 2007) was used to convert foreign and domestic values. This particular exchange rate is used because it prevailed when major companies imported their inputs, and the results closely reflect the situation in 2007.

The opportunity cost of land is normally considered the net value of production foregone when the use of land is changed from one (farming) activity to another. Alternatively, the opportunity cost of land can be estimated at its purchase or rental value. The crop most commonly produced by Zambian smallholders is maize, grown mainly for household food security. Zambia is a land-abundant country, so entering into new agricultural activities (value chains) does not normally require the producer to stop growing maize. Instead, the producer expands production to new land that is not being used for economic activity. The opportunity cost of this land was assumed to be zero, because it was not economically productive before. Since most land used in smallholder production systems is held under customary tenure arrangements (traditional leaders allocate land to households based on their requests), there is no land market that would allow one to determine the appropriate purchase or rental value for unused land. For the sugar outgrower scheme, the opportunity cost of land is also zero, because no other land uses are permitted.

Family labor often accounts for a large share of agricultural production costs, especially in smallholder systems. As family labor is not compensated with cash, some proxy value must be applied. A rule-of-thumb estimate was applied to the value chain calculations by charging family labor at 60 percent of the rate for casual labor hired by smallholders (equal to US\$0.75 per day). Smallholders rarely have the opportunity to sell their labor at the full rate every day of the year, and this method is at least a clear and simple way to recognize the value of this input.

No charge is included for family labor in the calculation of private costs and returns at the farm level. Family labor does have an opportunity cost, but excluding this value from the private cost/return estimates means that crop profits can be reinterpreted as returns to family labor. The benefit of this approach is that different enterprises can be compared without the risk of applying an incorrect proxy value.

Depreciation and cost of capital are estimated and included in the calculations. At the farmer level, very little capital equipment is used. The main items are sprayers for

pesticides. The annual per hectare (or per ton) cost of such long-term investments used at the farm level has been estimated using a straight line linear depreciation. In addition, general charges for depreciation are included, as well as the cost of repairs.

Smallholder cotton, tobacco, and sugarcane production benefit from outgrower support in which inputs are provided on credit, and services are supplied by a processing company or other agent. Costs related to the coordination of input distribution, extension advice, other services, and overall management of the outgrower scheme are important components of the overall cost of the value chain and are included in the models.

Details on the farm budgets used in the value chain analysis are provided in Table 2. Yield differences reflect different land management practices. It is interesting to note the low level of own labor supplied by sugarcane farmers. It is also important to note that the services provided to smallholders in the sugar scheme include land preparation and cultivation. KASCOL is also responsible for harvesting smallholders' cane, hiring cutters from within the regions for that purpose.

**Table 2: Details of farm budgets for four smallholder commercial crops, Zambia**

Crop	Farm-gate price in 2007/08	Yield level and labor input		
		Low yields	Medium yields	High yields
Cotton	US\$0.26/kg	Yield: 600 kg/ha Own labor input: 122 d	Yield: 1,200 kg/ha Own labor input: 124 d	Yield: 1,800 kg/ha Own labor input: 124 d
Burley tobacco	US\$1.50/kg	Yield: 800 kg/ha Own labor input: 400 d	Yield: 1,600 kg/ha Own labor input: 400 d	Yield: 2,000 kg/ha Own labor input: 400 d
Tomatoes	US\$3.75/crate	na	Yield: 200 crates of tomatoes from 0.25 ha Own labor input: 51 d	na
Sugar	US\$40.95/kg	Yield: 90 t/ha Own labor input: 7 d	Yield: 113 t/ha Own labor input: 7 d	Yield: 123 t/ha Own labor input: 7 d

Source: Study team fieldwork, Zambia, 2007

Note: na = not available

## SPATIAL EQUILIBRIUM MODEL

The ZAMSEM programming model simulates market equilibrium conditions for seven commodities—maize, cassava, domestic horticultural products, sugar, cotton, Virginia tobacco, and Burley tobacco—in all nine provinces of the country. ZAMSEM explicitly and endogenously models the equilibrium production, consumption, trade flows (internal and external), and prices. Its multimarket, regional structure makes this framework particularly well suited for analyzing marketing margins, transportation costs, and supply shifts across the country or in specific locations.

The model also simulates the impact of two types of policy interventions: policies to enhance farm productivity and policies to strengthen value chains. These cross-cutting

issues, identified in the value chain analysis, affect the entire value chain and have particular significance for smallholder incomes.

Income and trade flow indicators are generated to compare simulations. Income indicators generated by ZAMSEM include total nominal income in US dollars, total real income in US dollars, total and regional real farm income in US dollars, and per capita income in Zambian kwacha. Income in real terms is obtained by dividing the nominal income by a price index, which accounts for the consumer price variations of the seven commodities included in the model.

ZAMSEM is implemented using the Generalized Algebraic Modeling System (GAMS) programming language (Brooke et al. 1998). It is calibrated for the base year 2004, which was the most recent year for which comprehensive and reliable data were available. Furthermore, 2004 was considered a good year for crop production, without major supply or demand shocks. Supply and demand elasticities of ZAMSEM are either based on the literature or derived from similar models implemented in neighboring countries. Model specifications are available upon request.

#### **4. BENEFITS GOING TO SMALLHOLDERS**

Benefits received by smallholders were assessed in several ways: in terms of the competitiveness of the value chains, the nonmonetary and monetary benefits, the distribution of benefits between smallholders and others in the value chain, and income and employment along the value chain.

#### **INTERNATIONAL COMPETITIVENESS**

Smallholders' participation in global value chains depends to some extent on how successfully those chains compete at the international or regional level. How do Zambia's cotton, tobacco, and sugar industries measure up? As mentioned, considerable information was available to answer this question for cotton and sugar in 2006/07 (Keyser with van Gent 2007). For cotton, the analysis of competitiveness was done for both high-yielding (1,200 kilograms per hectare—the CCAA results) and very low-yielding systems (600 kilograms per hectare). Although the overall competitiveness of Zambia's cotton industry depends on the price build-up of cotton from both systems, for this analysis they could be examined only in isolation. For tobacco, yields of 1.25 tons per hectare were assumed, and for sugarcane, medium-range yields of 116 tons per hectare were assumed. The CCAA lacked specific data on processing costs, which were obtained by the study team. Because no prior information was available on the competitiveness of Zambia's tobacco industry, a new analysis was done for this study.

Table 3 provides the estimated gin-gate parity prices for Zambian lint that were used in the analysis. Tables 4, 5, and 6 compare the value of each crop with FOB prices in 2007/08 and 2006/07 under three exchange rate assumptions: a low, medium, and high kwacha value (K 4,285, 4,000, and 3,500, respectively). The analysis assumes constant

foreign costs (denominated in US dollars) and adjusts the value of domestic cost in US dollars according to the exchange rate assumption. The FOB price is the factory-gate equivalent price for tobacco, cotton, and sugarcane. Different price conditions naturally prevail at each factory gate depending on transport costs.

**Table 3: Estimated gin-gate parity prices for Zambian lint**

	Unit	US\$	
		Dec 2006	Oct 2007
Cotlook Index A	per lb	0.59	0.68
Plus premium for Zambian lint	per lb	0.02	0.02
Total CIF (Cotlook) value of Zambian lint	per lb	0.61	0.70
Conversion to metric tons	per t	1,353.26	1,536.19
Less sea freight to Durban	per t	140.00	140.00
Less road freight to Lusaka	per t	165.00	165.00
Less road freight to Katete	per t	45.00	45.00
Equals Katete gin FOB equivalent lint revenue	per t	1,003.26	1,186.19

Source: Study team calculations

FOB prices for sugarcane vary quite considerably in different markets, with the EU paying the highest price, followed by the Great Lakes countries, South African Customs Union (SACU), and Democratic Republic of Congo (DRC). The assumed FOB price is based on the price of US\$386 per ton on the unprotected world market and costs for containerized road freight to Durban and sea freight to northern Europe. Whereas high transport costs to Europe account for an estimated 45 percent of Zambia's export parity on the world market, lower freight costs are likely to be available to other regional destinations, especially compared to the costs that global competitors face in reaching these destinations.

**Table 4: Competitiveness of cotton, tobacco, and sugar (US\$/t) at low kwacha value (K 4,285 : US\$1.0)**

	Burley tobacco	Cotton (high yields)	Cotton (low yields)	Sugar
Domestic cost	2,289	683	832	15
Foreign cost	1,358	207	281	7
Total crop value	3,647	890	1,113	22
FOB price, 2006/07	3,800	1,003	1,003	19
FOB price, 2007/08	3,990	1,186	1,186	20

Source: Study team calculations

Note: For yield values see text

The data show that Zambia is a competitive producer of cotton and tobacco for the export market, with robust margins, although productivity increases by cotton farmers would improve overall performance. For sugar, even at the higher parity price, the total crop value is slightly higher than the FOB price, so the value chain appears uncompetitive, based on the assumptions used here. The analysis underscores that regional markets are the most competitive for Zambia.

**Table 5: Competitiveness of cotton, tobacco, and sugar (US\$/t) at medium kwacha value (K 4,000 : US\$1.0)**

	Burley tobacco	Cotton (high yields)	Cotton (low yields)	Sugar
Domestic cost	2,452	731	891	16
Foreign cost	1,358	207	281	7
Total crop value	3,810	938	1,172	23
FOB price, 2006/07	3,800	1,003	1,003	19
FOB price, 2007/08	3,990	1,186	1,186	20

*Source:* Study team calculations

*Note:* For yield values see text

The sensitivity analysis suggests that the competitiveness of cotton and tobacco is generally robust, but any trade advantage would be eroded by a strongly appreciating kwacha. Under a strong kwacha, Burley tobacco would be uncompetitive. Although cotton would remain competitive if yields were high and the slightly higher FOB price of 2007-08 prevailed, cotton production under very low yields would no longer be competitive.

**Table 6: Competitiveness of cotton, tobacco, and sugar (US\$/t) at high kwacha value (K 3,500 : US\$1.0)**

	Burley tobacco	Cotton (high yields)	Cotton (low yields)	Sugar
Domestic cost	2,809	835	1,018	18
Foreign cost	1,358	207	281	7
Total crop value	4,167	1,042	1,299	25
FOB price, 2006/07	3,800	1,003	1,003	19
FOB price, 2007/08	3,990	1,186	1,186	20

*Source:* Study team calculations

*Note:* For yield values see text

In addition to seasonal changes in parity prices, it should be noted that the competitiveness of individual enterprises depends on each firm's overhead costs, financing arrangements, the timing of input purchases, procurement decisions, and storage capacity. Because each farm and company has its own specific cost structure, the ability of each value chain participant to compete at world market prices depends greatly on how each farm or company organizes its own production system.

## NONMONETARY BENEFITS

Smallholders' participation in value chains depends not only on the competitiveness of the chains themselves but on the ancillary benefits smallholders can expect from participation and on the quality of governance in the chains. This section summarizes the nonmonetary benefits related to each commodity and describes the governance of each chain (its organization, institutions, and prevailing legislation and regulations). The main findings are summarized in Tables 7, 8, and 9.

The cotton and tobacco chains are organized very similarly (Table 7). Farmers and processors are linked via seasonal production agreements in which farmers form loose groups to receive services and inputs. Some firms use company-employed extension

agents to operate the schemes; other firms outsource this function to independent private operators. Low prices in 2005/06 owing to appreciation of the kwacha caused smallholders to abandon cotton and tobacco in substantial numbers, although production and prices were expected to rebound in 2007/08.

The distributor scheme, pioneered by Dunavant, is a market-based mechanism in which village-based agents (“distributors”) work on commission to mobilize, recruit, and contract farmers, distribute inputs, monitor crops, recover credits, and ensure that all of the cotton produced by the farmers they supervise is delivered to the company. Distributors are monitored by the company, which also maintains a central registry of contract farmers, with information on each farmer, the production area under contract, and the inputs provided.

**Table 7: Chain organization for study commodities**

	<b>Cotton</b>	<b>Tobacco</b>	<b>Sugar</b>	<b>Domestic horticulture</b>
Number of farmers involved	Fluctuates (280,000 in 2005; 180,000 in 2007)	Fluctuates (23,000 in 2005; 8,000 in 2007)	Stable (161)	Selling: 170,000 Producing: 500,000
Number of agribusinesses linked with farmers	5–8	4	1	None
Farmer organization	Loosely organized farmer groups	Loosely organized farmer groups	Kaleya Smallholder Farmers Association	None
Nature of linkage to agribusiness	Seasonal production agreement	Seasonal production agreement	14-year cane supply agreement; 14-year sublease	None
Services provided by agribusiness	<ul style="list-style-type: none"> <li>– Inputs (seed, chemicals)</li> <li>– Technical advice</li> <li>– Picking and packaging materials</li> <li>– Transport</li> <li>– Assured market</li> </ul>	Provision of inputs (seed, chemicals) much reduced over the last 2–3 seasons to minimum of 50 ha for some companies	<ul style="list-style-type: none"> <li>– Prepare land</li> <li>– Replant</li> <li>– Procure and provide inputs</li> <li>– Supply irrigation water</li> <li>– Provide grower extension</li> <li>– Transport cane</li> <li>– Provide crop insurance</li> <li>– Provide social services</li> </ul>	None

**Table 7: Chain organization for study commodities**

	<b>Cotton</b>	<b>Tobacco</b>	<b>Sugar</b>	<b>Domestic horticulture</b>
Pricing	Ginners set prices for grades, price competition for seed cotton, purchase at farm gate, negotiation on grade	Tobacco companies set prices for grades, purchase at farm gate or on auction floor, negotiation on grade, price competition for unprocessed tobacco	Price is calculated based on formula that includes retail price, mill efficiency, sugar quality, and division of proceeds (DoP). DoP is renegotiated every 5 years between farmers and processor	Sale at farm gate or in wholesale markets via intermediaries. Farmers are price takers and pricing mechanisms are rarely transparent

*Source:* Study team analysis

The contact farmer scheme operates like the distributor scheme, except that legal responsibility for repaying loans is placed on farmer groups, which rely on peer pressure to ensure that the cost of the inputs is recovered. A contact farmer is still needed to link the farmers with company staff, but the contact farmer is not individually responsible for distributing inputs and recovering loans. This system is used by Cargill (Clark) Cotton, ZCMT, and Continental Ginnery.

Prices in the cotton and tobacco industries are set by the companies, based on the market. Negotiations on grades occur between the farmer and agent at the farm gate or on the auction floor. The main difference between the cotton and tobacco outgrower schemes is that tobacco farmers receive fewer services. Another difference lies in the market dynamics created by firms in the two industries. While many new entrants in the cotton industry created additional demand for seed cotton, firms in the tobacco sector have reduced their investment in Burley.

The horizontal and vertical linkages within the sugar chain are far stronger than those in the tobacco and cotton value chains. The sugarcane value chain is characterized by the symbiotic (virtually captive) relationship between the mill and contract farmers. The formal agreement between cane growers and farmers lasts for 14 years. Growers receive a more extensive set of services compared to those received by tobacco and cotton farmers. Cane growers have also formed an association to represent their views in price negotiations and provide basic social services.

The domestic horticulture industry is characterized by a decentralized rural assembly system.<sup>8</sup> A recurrent theme in field interviews with vegetable producers was the poorly developed markets and volatile prices for horticultural crops. The nontransparent price discovery mechanisms characteristic of this industry are disadvantageous for smallholders, because they carry a high risk and result in high per-unit transaction costs. As a result, very few farmers sell their horticultural produce themselves. Most rely on

<sup>8</sup> Attempts by agribusiness to work with smallholders have generally failed, because smallholders have been unable to deliver the required quantities consistently. Some efforts to organize farmers through outgrower arrangements are still being pursued.

rural traders (“assemblers”), who travel from farm to farm purchasing produce, which they sell in the city. Smallholders also frequently bring their tomatoes and rape to Lusaka for sale to brokers (who charge a commission) rather than directly to wholesalers. Thus links between chain participants are generally weak, occurring deal by deal, albeit with the potential to develop over time. Farmers are not organized and receive no services from agribusiness aside from brokering.

If the chains are ranked according to the strength of their inner linkages, sugar is clearly at the top, followed by cotton, tobacco, and domestic horticulture. In the specific industries studied here, the value chains characterized by strong inner links appear more beneficial for farmers, because farmers participating in these chains receive more services and have greater influence over prices. Cane growers—who have the closest and most regulated relationship with agribusiness (the monopsonist Zambia Sugar Company)—receive more nonmonetary benefits than farmers in any of the other value chains.

With respect to governance, the institutions within each value chain vary significantly (Table 8). The cotton industry has developed institutions that play a key role in shaping the industry and provide an interface for all stakeholders. In contrast, no commodity institutions exist for domestic horticulture, which does not bode well for the capacity to innovate and influence the economic environment in this industry. The Tobacco Association of Zambia (TAZ) is a statutory authority that employs a small number of extension officers and operates auction and sales floors. Originally TAZ was also intended to promote and support research. Smallholders believe that TAZ could improve all three of these functions. A review of the responsibilities and capacities of the Tobacco Association seems warranted.

**Table 8: Value chain institutions for study commodities**

	Cotton	Tobacco	Sugar	Domestic horticulture
Farmer representation	Cotton Association of Zambia	Eastern Fodya Association; Tobacco Association of Zambia	Kaleya Smallholder Farmers' Association, Mazabuka Cane Growers Association	None
Industry representation	Zambia Cotton Ginners Association; Zambia Cotton Pre-financiers Association	Tobacco Association of Zambia	None	None
Research	Cotton Development Trust	Tobacco Research Station	None	None

*Source:* Study team analysis

In the sugar industry, the presence of formal institutions representing the entire value chain is not as important as it is in the other industries, because the sugar industry has such a small number of players. The Mazabuka Cane Growers Association (MCGA) is an apex organization for smallholders in ZSC’s outgrower scheme and for large-scale

commercial growers in the Mazabuka area. The MCGA has no paid staff. MCGA and ZSC maintain a joint committee where issues of importance are raised.

Another component of governance—legislation and regulations—varies significantly in its effect on the individual value chains. The Government of Zambia has enacted general legislation that affects the chains, such as the Agricultural Marketing Act and the Agricultural Credit Act, as well as industry-specific legislation such as the Cotton and Tobacco Acts.

In the cotton industry, the major players have organized under the Zambia Cotton Pre-financiers Association (ZACOPA) and are collaborating closely with MACO and the Cotton Association of Zambia (CAZ) to propose extensive revisions to the 2005 Cotton Act. A central provision of the Act is the creation of a Cotton Board, composed of private and public representatives, which is mandated to regulate the production and especially the selling and purchasing of seed cotton. The main revisions being addressed include the balance between public and private sector representation on the Cotton Board, the handling of appeals, clarification and proper use of the act's ambiguous terminology (including "cotton," "cotton seed," "seed cotton," "cotton planting seed," and "cotton lint"), removal of inconsistencies between various penalties, and adjustment of licenses from one to two years, taking into account the total cycle of cropping, ginning, and marketing. An agreement on these revisions and their swift implementation would be in the interest of all stakeholders and should be pursued.

The Tobacco Board of Zambia (TBZ) is a parastatal established by Parliament to regulate the tobacco industry sufficiently.<sup>9</sup> Although TBZ employs tobacco inspectors, their number is too low to monitor and regulate the industry. As with the Tobacco Association, a review of TBZ's responsibilities, capacity, and funding seems warranted.

The government's Outgrower Support Fund, which operates under MACO, is intended to support the cotton and tobacco industries by providing funds (in the form of partial loans) to supplement private efforts to supply inputs, provide extension services, and train farmers. The Cotton Development Trust claims that the Outgrower Support Fund has had a vast socioeconomic impact by increasing production, encouraging greater numbers of farmers to grow cotton, and raising incomes and employment. Yet the number of farmers who have benefited from this fund is small compared to the total number of smallholder cotton farmers (approximately 2.64 percent of smallholder cotton farmers in 2002/03 and 7.95 percent in 2003/04). The experience in the tobacco industry has been similar. It would appear that increased funds, disbursed more transparently,<sup>10</sup> would significantly increase the services (and thus the benefits) provided to smallholders in outgrower schemes.

The most relevant legislation for domestic horticulture is the Markets Act. Markets in Zambia can be managed either by the City Council or Marketeer Cooperatives, though

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<sup>9</sup> The TBZ also represents Zambia in a regional organization with Malawi, Mozambique, Tanzania, and Zimbabwe that is designed to share experiences, reduce price collusion among buyers, and harmonize tobacco legislation.

<sup>10</sup> Key informants did not fully understand how funds were disbursed. The study team could not further investigate this issue.

some observers in the Ministry of Local Government and Housing suggest that all markets legally belong to the City Council. Market management, the use of fees paid by marketeers, and land titles have been at the center of serious disputes between the City Council and Marketeer Cooperatives in recent years. Stakeholders (primarily traders but also communities) have therefore proposed an alternative model—Market Management Boards—that would enable them to manage and upgrade markets much more actively, as counterparts to public administrators. To create an environment that is more conducive to local trade, stakeholders are working with public officials to increase their awareness of the need to facilitate healthy commercial activity. The Markets Act is widely perceived as a barrier to this more participatory and decentralized approach, but although its revision is a high priority, as of this writing there is no prospect that the legislation will be revised or that the new management model will be instituted.

**Table 9: Legislation and regulations pertaining to study commodities**

	<b>Cotton</b>	<b>Tobacco</b>	<b>Sugar</b>	<b>Domestic horticulture</b>
Legislation	Cotton Act	Tobacco Act	None	Markets Act
Industry regulation	Cotton Board (proposed)	Tobacco Board	None	None
Government support (own funds only)	Outgrower fund	Outgrower fund	None	None

*Source:* Study team analysis

## **MONETARY BENEFITS**

To assess whether smallholders benefit economically from greater participation in value chains, the study team calculated returns at the smallholder level for the three highly commercialized value chains (cotton, tobacco, and sugar) and for domestic horticulture (Tables 10 and 11).

Under all yield assumptions, smallholders obtain healthy returns from participating in these value chains. Returns to family labor are positive for all four chains. The results for domestic horticulture are particularly encouraging. They suggest that further investment in this sector could increase farm incomes very significantly.

At medium and high yield levels, cotton and tobacco seem to be very good investments for smallholders. Even so, it is important to recall that the competitiveness analysis for cotton and tobacco suggests that although farmer’s margins are sustainable now, a very strong kwacha could reduce profitability.

Returns to family labor for cotton and tobacco are also very good, considering that the wage rate for rural casual labor is about US\$1.20 per day and that smallholders rarely have the opportunity to sell their labor at the full wage rate every day of the year.

Sugarcane farmers earn exceptionally high returns to family labor, partly because the outgrower scheme hires a large amount of labor, but also because of the good growing conditions in Zambia and the general profitability of the sugar industry. Yet even in the

sugar industry, as suggested by the competitiveness analysis, the exceptional profit margins may not be sustainable, and some downward adjustment might have to take place.

**Table 10: Benefits to smallholders participating in the cotton, sugar, and tobacco value chains**

Value chain	Indicator	Low yield	Medium yield	High yield
Cotton	Return to family labor (US\$/d)	0.65	1.71	2.77
Burley tobacco	Return to family labor (US\$/d)	0.68	2.44	3.32
Sugar	Return to family labor (US\$/d)	134	183	204

*Source:* Study team calculations

*Note:* For yield values see Table 2

**Table 11: Benefits to smallholders participating in the domestic horticulture value chain**

Indicator	Tomato production	Watermelon production and trade
Return to family labor (US\$/d)	1.94	5.99

*Source:* Study team calculations

It is commonly thought that there is a tradeoff between growing commercial crops and food crops and that farmers cannot grow both kinds of crops without jeopardizing household food security. Yet there is no agronomic evidence of a tradeoff between growing maize and the commercial crops analyzed in this study. Among farmers, it appears to be well known that maize can be grown in rotation with cotton, tobacco, and horticultural crops, if there is sufficient rainfall and soil moisture (usually there is). In fact such rotations characterized most of the smallholders farming systems examined for this study. Farmers know that maize or any other crop planted in rotation with commercial crops benefits from the residual effects of fertilizer applied to the commercial crops. As mentioned, the abundance of land also means that farmers do not have to sacrifice maize production (and thus food security) to grow commercial crops and participate in new value chains.

Within the cotton industry and in the wider public arena, considerable discussion has erupted over what is a “fair” price to pay to farmers for cotton.<sup>11</sup> The debate ranges from arguments that farmers should receive the market price to arguments that farmers should be paid a minimum rate, regardless of the market price, to ensure their food security and a reasonable standard of living. Much of this debate fails to consider that farm profitability depends not only on the price farmers receive but on the costs they incur—which is why the yields obtained in smallholder farming systems are so important.

Table 10 shows how an increase in cotton yield (and consequently a reduction in average costs) moves the production system from a modest return at 600 kilograms per hectare to a highly positive return at 1,800 kilograms per hectare. Dunavant’s YIELD program has shown that if farmers make relatively minor investments in management techniques, they are very likely to double their yields from 600 to 1,200 kilograms per hectare (van Gent

<sup>11</sup> For example, see Price (2006).

2007). This finding contradicts the conventional notion that smallholders are trapped in low-input, low-output systems.

In conclusion, smallholders certainly appear to benefit financially from the value chains studied here. They obtain good returns to family labor from participating in value chains for cotton, sugar, tobacco, and domestic horticulture. These activities do not preclude the production of food crops, and they provide cash to invest in human and physical capital.

## **NET INCOME AND EMPLOYMENT DISTRIBUTION ALONG THE VALUE CHAIN**

Based on the costs and margins for each value chain, the value accruing at each stage along the value chain was calculated, taking into account profit margins, the costs of hired labor, and the cost of own labor in the case of farmers. Because it reflects the often vastly different volumes handled by participants at each stage in the value chain, this analysis of net income gives a more accurate picture of the true distribution of benefits than the analysis of cost and margins.

A very rough estimate of the number of people employed in each value chain (as wage laborers and as farmers) is provided in Table 12. Earnings per person per day are also calculated, based on a very rough division of total sector earnings by the number of people employed in the sector. This would include cost of production and profits accruing to processors and should be interpreted only in terms of the relative returns to each sector. Having said that, daily returns in the cotton, tobacco, sugarcane and domestic horticulture sector look to be within the range of the study team's estimates.

**Table 12: Earnings and employment for each value chain studied and for export horticulture**

Value chain	Sector earnings (US\$ m)	Wage employment (number of permanent and seasonal employees)	Small-scale farmers (number)	Earnings per person (US\$/d)
Cotton	81	2,300	280,000	1.30
Tobacco	63	92,000	23,000	2.49
Sugarcane	65	4,000	1,692	51.91
Export horticulture	55	14,500	2,500	14.71
Domestic horticulture	116	10,000	526,406	0.98

*Source:* Various sources, including ZNFU and FSRP 2006 and study team calculations

*Note:* Earnings based on 220 d work per year

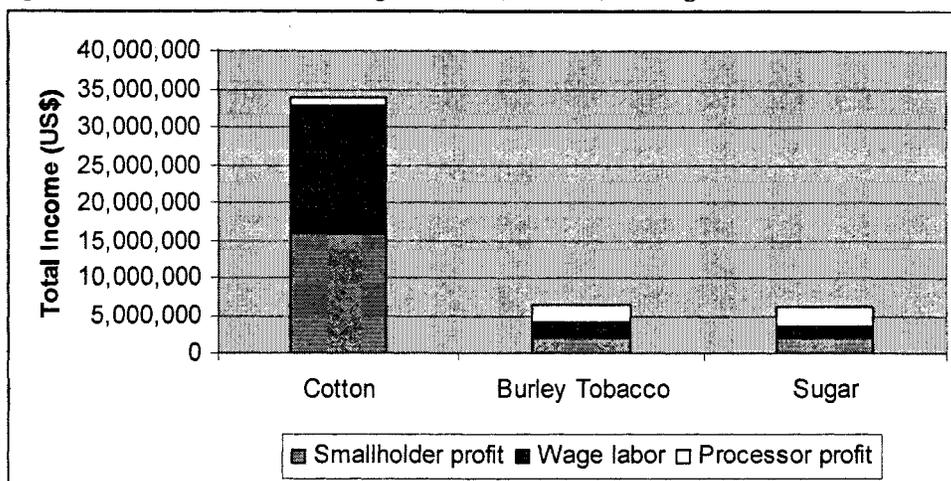
Some of the figures are open to interpretation and differ from study team findings. For example, only 161 smallholder farmers grow sugar in the Nakambala scheme, yet ZNFU and FSRP (2006) suggest that more than 1,692 smallholders grow sugar. Certainly this may be the case if artisanal sugarcane growers are included, but at best they would plant only a few square meters per household. In addition, many activities in each value chain are undertaken by subcontractors such as transporters, for whom the breakdown of transport costs, actual wages, and profit margins is unknown.

The value of wage employment differs significantly across industries, locations, and job types, and it is quite difficult to identify a common (or even indicative) set of daily rates. For example, rural agricultural wages are around K 5,000 per day (US\$1.20), but they differ by location, activity (such as harvesting, weeding, or land preparation), the opportunity cost of labor, and the period of employment (long term or seasonal). For long-term employment, benefits such as social security, leave, and other bonuses need to be taken into account. Estimates by ZNFU suggest that the true cost of unskilled labor is around US\$5 per day when all labor law requirements are included.

Figure 3 compares wage costs and profit margins for the smallholder cotton, Burley tobacco, and sugarcane value chains. The calculations present the total value for each industry, taking all actors into account (cost per kilogram \* kilogram per person \* number of persons), so they are obviously skewed towards those value chains with more actors. In other words, the results show the contribution of each value chain to Zambia as a whole, rather than on a per-person basis (for which Table 12 presents a better estimate).

For the cotton value chain, Figure 3 shows the high value created at the farming stage and the importance of wage labor. The cotton industry clearly provides significant income, not only to smallholders but to wage employees. In comparison, the absolute profit of processors is relatively small, given the size of the industry. Processor profit margins are estimated to be in the range of US\$0.0054 per kilogram, or US\$990,000 for the whole crop, which is similar to industry estimates (Dunavant in fact reports a net loss). The same observation cannot be made for the sugar and tobacco chains, where the shares of value are about equal in the growing and processing stages.

**Figure 3: Income distribution along the cotton, tobacco, and sugar value chains**



Source: Study team calculations

What is the relative contribution of the smallholder cotton, Burley tobacco, and sugarcane value chains to Zambia (Figure 3), considering the numbers of actors in each chain and the daily rates per person (Table 12)? The cotton value chain makes a bigger contribution to the Zambian economy than the chains for tobacco and smallholder sugarcane. This is obvious, since the cotton industry provides employment to over 280,000 smallholders compared with only 9,000 tobacco producers and 161 sugarcane farmers. Burley tobacco and smallholder sugarcane production contribute about the same gross value to Zambia, in terms of returns to smallholder farming as well as to wage employment, despite the vast difference in the number of people employed in each value chain.

## **5. INCREASING THE BENEFITS GENERATED BY SELECTED VALUE CHAINS**

The analysis has shown that smallholders not only benefit from participating in value chains for cotton, tobacco, sugar, and domestic horticulture, but that these benefits could be increased by improving agricultural productivity and strengthening links along the value chains. Higher yields obtained by smallholders could potentially deliver large increases in returns to family labor. For cotton, it appears that yields can be increased solely through better farm management practices, without costly cash outlays for inputs. The governance analysis emphasizes that overall competitiveness and benefits for smallholders improve when stakeholders in value chains work more collaboratively to take advantage of market opportunities. Strong linkages among commercial stakeholders (farmers, traders, and processors) can improve technology, infrastructure, and access to markets.

Given these findings, could specific policy interventions potentially increase the benefits received by smallholders and improve value chain performance? To answer this question, the ZAMSEM model was used to simulate the response to alternative policy interventions

in the short and medium term. The interventions included policies to enhance farm productivity and policies to strengthen value chains. Each simulation is implemented by changing the corresponding parameters in ZAMSEM. In general, the changes applied in the simulations presented in this report are small. They reflect realistic changes in parameters based on the proposed interventions. (It is also useful to recall that the model covers seven commodities—maize cassava, domestic horticultural products, sugar, cotton, Virginia tobacco, and Burley tobacco—and all of Zambia’s nine provinces.

## **POLICIES TO ENHANCE FARM PRODUCTIVITY**

A broad range of policies can enhance farm productivity, including policies to strengthen extension, supply inputs, support research, and provide irrigation. In ZAMSEM, the impact of such policies is simulated by changing the yield levels for each crop and region involved in the simulation.

ZAMSEM supply data distinguish between small- and medium-scale farms and commercial farms; for obvious reasons, the simulations presented here focused on yield changes for small- and medium-scale farmers. Two simulations were done:

- (i) A 10 percent yield increase in all crops for small- and medium-scale farmers.
- (ii) A 30 percent increase in cotton and tobacco yields for small- and medium-scale farmers.

Overall, the major effect of these policies is to boost production, consumption, and exports (Table 13). In general, the effects recorded in these simulations are qualitatively similar, meaning that the sign of the change of the outcome variables tends to be the same. In the first simulation, the 10 percent yield increase raises real farm income from all crops by approximately US\$15.4 million (6 percent higher than the base scenario). The increase of total income in real terms is substantially higher (about US\$155 million) owing to a significant decline in the price index (approximately a 3.4 percent drop from the base scenario level). In the second simulation, which concerns cotton and tobacco only, the change in real farm income is less substantial (US\$7.2 million), as one would expect, given that the intervention is more targeted. In this case, the changes in farm, real, and nominal total income are equivalent, because the consumer price index (CPI) does not change.

**Table 13: Selected income and trade indicators for policies to enhance farm productivity**

Simulation changes		Total income	Total real income	Real farm income	Export value	Intra-regional trade	Inter-regional trade
Base scenario value		4,524.7	4,524.7	246.8	121.8	380.6	77.8
Value with farm productivity policies	Raise yields of all crops 10%	5.6	154.9	15.4	29.3	2.3	-4.9
		0.1%	3.4%	6.2%	24.1%	0.6%	-6.4%
	Raise tobacco and cotton yields 30%	7.2	7.2	7.2	10.1	10.2	1.5
		0.2%	0.2%	0.2%	8.3%	2.7%	1.9%

*Source:* Study team calculations, based on ZAMSEM results.

*Note:* Except percentage change, all values in US\$ millions.

The regional impact of the two policy options differs because of differences in the geographic distribution of the crops. Table 14 shows the effect of this simulation on per capita income and aggregate farm income by province. In the first simulation, the effects on real farm income are larger in provinces where agriculture traditionally is dominant, especially Central, Eastern, and Southern Provinces. These are also the provinces where a policy focused on increasing cotton and tobacco yields would have the largest impact on farm income, even though the effect in Southern Province would be modest. A policy that increases yields of basic food products (as reflected by the first simulation) would also benefit real per capita income in provinces with larger urban populations, such as Lusaka and Copperbelt, because the CPI would decline by about 2 or 3 percent.

Clearly, the benefits of these two options should be viewed in light of the different scope, and hence costs, of each. The costs of a policy focused on cotton and tobacco yields would certainly be more contained. Such a policy might also be easier to implement, given the widespread diffusion of outgrowing schemes and associated private extension arrangements in these two industries.

If the YIELD program for cotton, implemented by Dunavant with support from donor agencies, were extended to all cotton and tobacco smallholders, it could significantly benefit Zambia by increasing farm incomes and export values. The cost of implementing a policy to raise yields of all crops is unknown but likely to be high. The YIELD program, which is regarded as relatively cheap and cost effective, trains 45,000 farmers per year at a cost of US\$920,000. More than half of these farmers (28,900) doubled their cotton yields.

The simulation in which cotton and tobacco yields rose by 30 percent calculated the yearly benefit to real farm income at US\$7.2 million. At a cost of around US\$20.44 per farmer; the YIELD program would cost US\$6.13 million to implement for all 300,000 smallholder cotton and tobacco farmers. Thus a one-time training of US\$6.13 million would generate real farm income benefits of US\$7.2 million per year. Even in a worst-case scenario, in which the benefits are only transient and evaporate after five years, the internal rate of return would be 112 percent—a significant return on any investment in improving farm productivity.

**Table 14: Selected regional income indicators for policies to enhance farm productivity**

Simulation changes		Real farm income								
		Central	Copper-belt	Eastern	Luapula	Lusaka	North-ern	North Western	South-ern	Western
Base scenario value		35.1	16.5	62.5	14.3	8.9	29.3	7.8	60.1	12.3
Value with farm productivity policies	Raise yields of all crops 10%	2.678	0.428	5.398	0.797	0.076	1.527	0.230	3.587	0.643
	Raise tobacco and cotton yields 30%	7.6%	2.6%	8.6%	5.6%	0.9%	5.2%	3%	6%	5.2%
		1.670	0.016	4.928	0.001	0.052	0.021	0.000	0.375	0.101
		4.8%	0.1%	7.9%	0%	0.6%	0.1%	0%	0.6%	0.8%

Source: Study team calculations, based on ZAMSEM results

Note: Except percentage change, all values in US\$ millions.

## POLICIES TO STRENGTHEN VALUE CHAINS

Policies to strengthen value chains support better coordination—and hence better efficiency—among the participants in the value chain. This approach normally requires appropriate institutional mechanisms to be set in place. The value chains analyzed in this study face very different challenges. The performance of the cotton and tobacco industries, in which the linkages between agribusiness and smallholders are quite close, is seriously limited by ineffective enforcement of contracts. In contrast, the ties between agribusiness and smallholders growing horticultural crops for the domestic horticulture market are very weak. The performance of this industry would benefit substantially from support for marketing services and a more transparent and competitive trading environment.

The following discussion first considers the specific issue of contract enforcement and then presents results of a simulation of policies to improve coordination in value chains.

### Contract enforcement

Agribusinesses like Dunavant have invested heavily in outgrower schemes to build their supply base and processing capacity. The development of a smallholder sector with the technical capacity to supply a consistent production base is no easy task. In 2006/07 alone, Dunavant provided over US\$10 million in inputs on credit to its outgrowers.

It is universally recognized within the industries examined here that contracts are broken on an almost daily basis. The effect of broken contracts on loan recovery and ultimately on the financial viability of the value chain is quite serious. For example, in side-selling cases (Box 1) farmers receive inputs, equipment, and extension on credit from one company but sell their production to a second company (either at the second company's urging or on their own initiative). The first company does not recover the cost of the inputs provided. It is left with a heavy debt and no product to process.

#### Box 1: Farmers' and firms' reasons for side-trading and its costs

Farmers engage in side-selling if the immediate income from side-selling plus the income from next season's participation in an outgrower scheme times the probability of access is higher than the contracted income plus the income from next season's participation in the outgrower scheme. The probability is less than one but not zero. Companies try not to work with farmers who have a history of defaulting, and the mechanisms employed (such as blacklisting) have made it more difficult for farmers to enter outgrower schemes if they have defaulted in the previous year. Yet effective monitoring is difficult and costly. Some farmers sell part of their cotton production to the company that supplied the inputs and services so they can repay their debt and ensure that they receive next year's services. They then sell the remaining cotton to the highest bidder. To repay their debt, farmers also make use of extended family and friends, who take out loans on behalf of the defaulted farmer.

Firms engage in side-buying because it is expensive to support outgrowers. In years when production is low and processing plants are not being used to capacity, competition for raw materials among processors intensifies along with side-trading. In 2007/08 the side-buyer price for 1 kilogram of seed cotton was one US cent above the outgrower price paid by Dunavant.

A back-of-the-envelope calculation illustrates the impact of side trading. In 2006/07 Dunavant sponsored 200,000 farmers and supplied inputs worth US\$10 million. Given a recovery rate of 70 percent on the input credit, the amount lost to default is US\$3 million. If this cost is passed on to individual farmers, each one will incur a deduction of US\$15 from his or her sales. A further indication of the cost of weak contract enforcement and its impact on value chain competitiveness is the incentive payment made by Dunavant to its distributors if they fulfill their responsibility to fully recover the cost of the inputs provided to the farmers they supervise. Distributors receive 22.5 percent of the total value of inputs for 100 percent recovery, which amounts to US\$0.02 per kilogram of seed cotton. The input costs that Dunavant fails to recover must be at least as high. Both calculations show that weak contract enforcement is a significant cost, given the margin of competitiveness of the cotton industry and processors' one percent profit margin.

*Source:* Study team

Key informants indicated that there is a real danger that cotton and tobacco companies will cease operations because of poor returns and side-marketing. Zambia Leaf has already pulled out of Burley tobacco production in Eastern Province because of poor credit recovery, while Dunavant contends that the low returns to cotton processing made them question their investment in Zambia. If any of the major firms in the cotton or tobacco industry reduce their involvement, particularly Dunavant (with its nearly 200,000 outgrowers), the impact on Zambia's economy would be marked.

From the perspective of an agribusiness with a large outgrower base, it is virtually impossible and financially infeasible to recover all of the credit extended to farmers. Even so, sophisticated mechanisms have been developed to make contracts self-enforcing and avoid costly disputes—market-based mechanisms, peer-pressure mechanisms, blacklists of defaulters, and coordination among ginneries through existing and new institutions. These mechanisms significantly increase the cost of doing business, however, and their performance is not satisfactory, as recent events have shown.

It is critical for all stakeholders to solve this problem. Any solution will require efforts from all chain participants and the public sector. Industry must continue to coordinate stakeholders' efforts through the institutions that have been established for this purpose (see the previous discussion of chain governance). Zambia's experience with outgrowers has contributed to recommendations on best practices for outgrower schemes (World

Bank 2006). The recommendation to register growers and maintain records is particularly relevant for enforcing contracts:

In order to ensure good and transparent management practices of out-grower operations it is imperative to develop Management Information Systems which would include information regarding personal details of participating smallholders, location, credit provision, and previous crop history. Computer programs could be designed to facilitate monitoring the performance of individual smallholder farmers....

World Bank (2006:68)

It is equally important to reach out to farmers to increase their awareness of the problem. They are trapped in the prisoner's dilemma, in which individual profit maximization through side-selling leads to a suboptimal outcome for everyone.

In addition, several mechanisms could be incorporated into any contracting process to strengthen informed consent and reduce the risk of default without interfering with the terms and conditions of the contract:

- To increase farmers' understanding of contract terms and conditions, contracts should not only be in English (as is currently the case) but in the local language, with the English version being legally binding.
- Contracts should be in duplicate. Smallholders can retain a copy for their records and companies can refute claims that farmers did not know what was stated in the contract. Contracts should have a clause stipulating that in signing the contract each party attests that it has received a copy of the contract.
- For farmers to understand the returns they are likely to achieve under the contract, contracts should specify a particular price-by-grade matrix that will be applied on delivery of the product. If the end-of-season price cannot be specified in advance, then the contract should state how that price will be determined and provide the likely worst- and best-case scenarios.
- Contracts should specify the penalties incurred for breaking or partially breaking the agreement.

Finally, to facilitate cooperation between value chain participants, the public sector must provide an enabling environment, characterized by an effective, formal contract enforcement system that involves credible sanctions for breaking contracts. Several mechanisms can be used, but the design parameters should be local and cost effective. Traditional authorities could play a role and should be involved in the design.

### **Value chain coordination**

Aside from contract enforcement, what other strategies might strengthen the value chains in the study? Better coordination among value chain participants is contingent on private sector initiatives but can be facilitated by a transparent, stable public policy environment, clear regulation to promote competition, public support to increase access to market and price information, and promotion of market linkages (for example, through trade fairs).

Two sets of simulations were done to assess the effect of policies to strengthen value chains. The first simulation involves a decline in domestic marketing margins for all crops. The second simulation examines the effect of improved coordination within value chains, which can result in modest and simultaneous changes in three parameters (marketing margins, yields, and transportation costs). The specific changes for each simulation are:

- (i) A 20 percent decline in domestic marketing margins, for all crops across the country.
- (ii) A 10 percent decline in domestic marketing margins, combined with a 5 percent increase in yields and a 5 percent decline in transportation costs, for all crops across the country.

Results of the simulations are presented in Tables 15 and 16.

**Table 15: Selected income and trade indicators for policies to strengthen value chains**

Simulation changes		Total income	Total real income	Real farm income	Export value	Intra-regional trade	Inter-regional trade
Base scenario value		4,524.7	4,524.7	246.8	121.8	380.6	77.8
Value chain policies	For all crops, domestic marketing margins decline 20%	7.4	83.4	12.5	3.1	1.1	-0.7
		0.2%	1.8%	5.1%	2.6%	0.3%	-0.9%
	For all crops, domestic marketing margins decline 10%, yields increase 5%, transport costs decline 5%	8.3	114.2	15.3	18.4	2.2	-1.7
		0.2%	2.5%	6.2%	15.1%	0.6%	-2.2%

Source: Study team calculations based on ZAMSEM results.

Note: Except for percentage change, all values in US\$ millions

**Table 16: Selected regional income indicators for policies to strengthen value chains**

Simulation changes		Real farm income								
		Central	Copper-belt	Eastern	Luapula	Lusaka	North-ern	North West-ern	South-ern	West-ern
Base scenario value		35.1	16.5	62.5	14.3	8.9	29.3	7.8	60.1	12.3
Value chain policies	For all crops, domestic marketing margins decline 20%	1.956	1.100	3.542	0.127	0.633	0.548	0.298	4.138	0.145
		5.6%	6.7%	5.7%	0.9%	7.2%	1.9%	3.8%	6.9%	1.2%
	For all crops, domestic marketing margins decline 10%, yields increase 5%, transport costs decline 5%	2.520	0.778	4.855	0.440	0.355	1.135	0.268	4.524	0.408
		7.2%	4.7%	7.8%	3.1%	4%	3.9%	3.5%	7.5%	3.3%

Source: Study team calculations, based on ZAMSEM results

Note: Except percentage change, all values in US\$ millions

These policies, which are expected to reduce marketing margins at various levels of the marketing chain, benefit farmers and consumers alike. Producer prices increase, in most cases, and consumer prices decline or remain stable; these effects in turn stimulate production, consumption, and exports. The changes in income levels are positive for both total income and farm income, and the regional effect is caused by geographical patterns of crop production.

Under the first policy scenario, at the national level farm income increases by approximately US\$12.5 million. Total income in real terms grows by US\$83.4 million. Under the second policy scenario, farm income increases by approximately US\$15.3 million and total income in real terms grows by US\$114 million.

The largest impact is on maize production and exports. This result may appear surprising, considering that maize has a relatively loosely structured value chain, similar to that of domestic vegetables and cassava. One might expect the highest export response to be seen in value chains that are relatively better organized and governed, which would be better positioned to capture the benefits of improved chain efficiencies. However, there are diminishing marginal returns to improving efficiency, and the cotton and tobacco chains are already arguably more efficient (and organized) than the maize and domestic horticulture chains—as seen in the relatively high effect of both simulations on real farm income in Lusaka and Copperbelt, the two most urban provinces. This result is explained by the importance of the vegetable industry in those provinces and the large effect of increased marketing efficiency on this subsector.

Given the large potential benefits from improving market linkages and increasing marketing efficiency for smallholders raising horticultural crops for the domestic market, a vital first step would be to develop a strategy to improve market linkages and marketing efficiency. The governance analysis in this study emphasized that revising the Markets Act is an important means of improving the trade environment for local markets, increasing market transparency, and facilitating value chain coordination.

## **6. CONCLUSIONS AND RECOMMENDATIONS**

Under yield assumptions ranging from low to high, Zambian smallholders obtain healthy returns from participating in four commercial value chains. They have significant potential to achieve higher returns by increasing farm productivity. Returns to family labor are positive for all four value chains.

The results for domestic horticulture are especially encouraging, because they suggest that investment in this industry would contribute significantly to raising farm incomes. Profit margins and competitiveness in the smallholder cotton and tobacco industries are fairly robust but would be reduced by a stronger kwacha (that is, at levels higher than K 3,500 : US\$1.0). Sugarcane farmers benefit from very high profit margins and exceptionally high returns to family labor, largely because of Zambia's good growing conditions, the industry's general profitability, and how the outgrower scheme is

organized. Even so, some downward adjustment might have to take place to increase the industry's international competitiveness.

The nonmonetary benefits that smallholders receive by participating in value chains, such as inputs and extension services, play an important role in transferring agricultural knowledge in Zambia. The quality and availability of public extension services were greatly curtailed following the 1991 reforms and subsequent budget cuts. To compensate, the cotton and tobacco industries have invested heavily in supplying extension services and inputs to producers. Managing outgrower schemes accounts for 8 percent of cotton processors' costs and 14 percent of tobacco processors' costs. In contrast, smallholders who grow horticultural crops for the domestic market receive no services whatsoever, because they are only weakly linked to agribusiness. Sugarcane growers receive the highest nonmonetary benefits because of their symbiotic relationship with the monopsonist ZSC.

These findings suggest that targeted investments by the public sector to support value chain development and outgrower schemes could greatly support the government's strategy for equitable growth and agricultural diversification through growth in commercial agriculture. Based on the findings and the level of monetary and nonmonetary benefits obtained by smallholders, this study concludes that smallholders do benefit from participating in these value chains. The favorable returns from these value chains indicate that Zambia has an important opportunity to move forward with an agenda to diversify agricultural production systems.

The public sector can take steps to promote value chain development and, in particular, sustain and increase the benefits to smallholders who participate in value chains. In the short term, the focus should be on strengthening value chain linkages. In the medium to longer term, investments in transport, energy, and telecommunications in rural areas with the highest potential for agricultural growth will be essential for generating new economic opportunities, facilitating value chain development, and increasing the number of smallholder participants.

In the near term, two kinds of policies can strengthen value chain linkages: policies to ensure that contracts are enforced and policies that improve coordination among value chain participants and thus increase the chain's efficiency.

Weak contract enforcement is endemic in the industries studied here. The profitability of the cotton and tobacco value chains is seriously undermined by routine side-selling and side-buying. Contract enforcement systems develop gradually as an economy develops, and when an economy is small, informal means suffice to resolve conflicts (World Bank 2002). As Zambia's economic activity becomes increasingly complex and commerce expands, the demand for formal intervention has grown. The government should meet this demand by ensuring that commercial disputes in rural areas can be resolved effectively, in a timely and affordable fashion. In this respect, important steps towards improving the business climate include developing an improved local system for sanctioning contract-breaking and building farmers' awareness of the consequences, especially the costs, of side-selling.

In addition to public efforts to improve contract enforcement in rural areas, the tobacco and cotton industries can take several actions to ensure that sanctions for contract violations are applied only rarely. First, firms can invest in information management systems to improve their monitoring of farmers. Second, they can adopt better contracting practices, such as informed consent and the use of local languages, to reduce misunderstandings about the mutual responsibilities specified in the contract. Finally, coordination among all stakeholders can be improved through the institutions established for this purpose.

Although improving the coordination among value chain participants is contingent on private sector initiatives, it can be facilitated by the public sector in several ways: through a transparent and stable policy environment; clear regulations to promote competition; public support for better access to market and price information; and active promotion of market linkages. Revisions of the Market and Cotton Acts are significant steps towards these goals. In the tobacco chain in particular, coordination could be further improved by a thorough review of the responsibilities, capacity, and funding of the Tobacco Board and Tobacco Association, to enable them to provide better services to the industry.

Some financial assistance has already been provided to support value chain coordination through MACO's outgrower fund, which has had some notable achievements despite its limited funding. Value chain coordination could probably be improved by increasing these funds and disbursing them in a more transparent manner to foster new partnerships between smallholders and agribusiness.

Finally, it would appear that combined public and private support for knowledge transfer could offer very significant benefits to smallholders and value chains. Private outgrower schemes have proven very successful in transferring knowledge to farmers, with implications for organizing other extension efforts. A one-time investment in training all 300,000 cotton and tobacco farmers to use better farming practices and improved technologies would cost US\$6.13 million and generate real farm income benefits of US\$7.2 million per year. Even if these benefits last for only five years, the internal rate of return to this training would be 112 percent, a significant return on any investment in improving farm productivity.

## REFERENCES

- Brooke, A., D. Kendrick, A. Meeraus, and R. Raman. 1998. *GAMS: A User's Guide*. Washington, DC: GAMS Development Corporation.
- Dunavant. 2005. "Cotton Training Guide for Area Coordinators to Support Training for the Expanded YIELD Programme," Dunavant Zambia Ltd., Lusaka.
- . 2007. "YIELD/CmiA Programme 2005–2007: Sustainable and Improved Farmer Cotton Yields," Dunavant Zambia Ltd., Lusaka.
- Estur, G. 2006. "Quality and pricing of African upland cottons." Presentation to World Bank, Washington, DC.
- FAOSTAT. 2007. FAO Statistical Database. Rome: Food and Agriculture Organization of the United Nations.
- GDS (Global Development Solutions). 2006. "Value Chain Analysis for the Cotton-to-Garment Sector in Zambia." Report for the Ministry of Tourism, Environment, and Natural Resources and the Ministry of Industry, Trade, and Commerce, GDS, Lusaka.
- Gereffi, G., J. Humphrey, and T. Sturgeon. 2005. "The Governance of Global Value Chains." *Review of International Political Economy* 12(1): 78–104.
- Hichaambwa, M., and D. Tschirley. 2006. "Zambia Horticultural Rapid Appraisal: Understanding the Domestic Value Chains of Fresh Fruits and Vegetables." Working Paper No. 17. Food Security Research Project Market Access, Trade, and Enabling Policies (MATEP) Program, Lusaka.
- INESOR (Institute of Economic and Social Research). 2005. "Value Chain Analysis for Selected Crops and Access to Market Information for Increased Market Share." Institute of Economic and Social Research and University of Zambia for the Business Experience Exchange Programme (BEEP), Lusaka.
- Keyser, J.C., with R. van Gent. 2007. "Zambia Competitiveness Report." Washington, DC: World Bank, Environmental, Rural, and Social Development Unit.
- Nsiku, N., and W. Botha. 2007. *Tobacco Revenue Management: Malawi Case Study*. Manitoba: International Institute for Sustainable Development.
- Price, A. 2006. "Cotton Formula Price Model: Presentation to the Ministry of Agriculture and Cooperatives." Smallholder Enterprise and Marketing Programme, Agribusiness Development Component (SHEMP–ABC), Lusaka.
- Tschirley, D., and S. Kabwe. 2007. "Multi-country Review of the Impact of Cotton Sector Reform in Sub-Saharan Africa: Zambia Country Study." World Bank, Lusaka.
- van Gent, R. 2007. "Socio-Economic Impact of the 'Cotton made in Africa' Project in Zambia." Agridev Consult for Deutsche Investitions- und Entwicklungsgesellschaft MBH, Lusaka.
- World Bank. 2002. *Building Institutions for Markets*. World Development Report 2002. Washington, DC: World Bank
- . 2006. *Zambia - Smallholder Agricultural Commercialisation Strategy*. Report No. 36573-ZM. Washington, DC: World Bank, Environment, Rural, and Social Development Unit.
- . 2007. *Using Value Chain Approaches in Agribusiness and Agriculture in Sub-Saharan Africa*. Washington, DC: World Bank.
- ZANU and FSRP (Zambia National Farmers' Union and the Food Security Research Project). 2006. "Potential Impact of the Kwacha Appreciation and Proposed Tax Provisions of the 2006 Budget Act on Zambian Agriculture." Zambia National Farmers' Union and the Food Security Research Project, Lusaka.

## ANNEX A: THE COTTON VALUE CHAIN

### GOVERNANCE

#### Organization

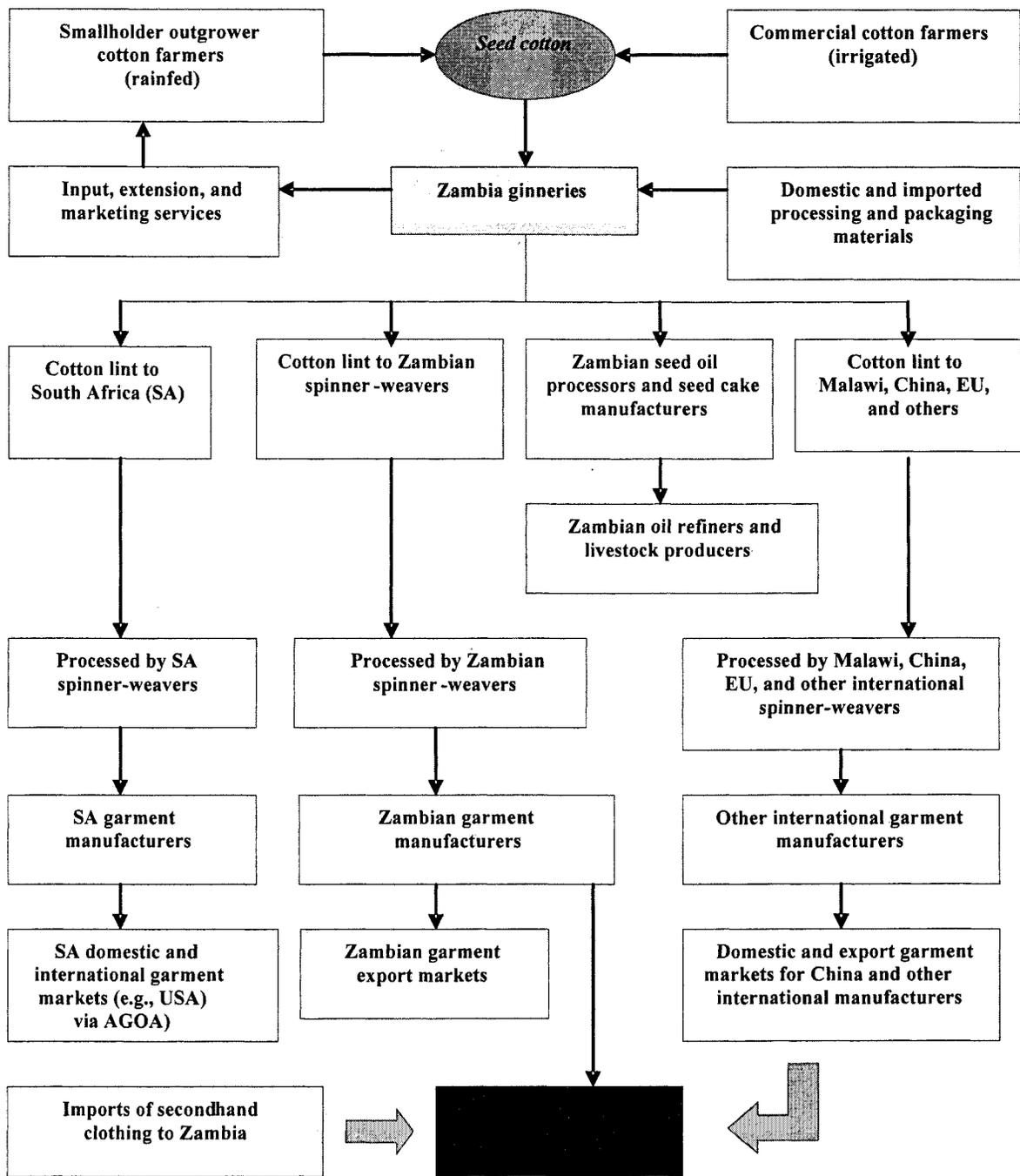
A.1 Cotton is grown and harvested by farmers, who then transport it to a collection point where it is bulked. From there it is sent to a district collection point and then to a ginnery for processing. The structure of the industry and the main players are depicted in a marketing chain format in Figure A.1.

A.2 Eight ginning companies currently operate in Zambia (Table A.1), a number of them recent entrants. Ginners engage in price competition for seed cotton. Prices paid to farmers are based on international market prices, with deductions for all processing and marketing costs. Pricing factors include margins and return on capital investment, as well as returns to shareholders. Dunavant provides a preplanting price, which is the minimum guaranteed price. Cargill typically follows Dunavant's pricing. Usually Dunavant acts as a price-setter (Stackelberg Leader), and the other firms set slightly higher prices, once Dunavant's price is announced. Attempts have been made to introduce a pricing formula as a means to develop transparency in the industry (Estur 2006; Price 2006), but difficulties in achieving a consensus on industry costs and returns have hampered these activities.

A.3 The entrance of many new buyers in recent years shows that Zambian cotton is attractive for foreign investors. It also suggests that competition among ginneries for seed cotton will increase, which should raise prices paid to farmers. On the other hand, the cotton industry in Zambia has a long history of credit default by smallholders, and side-selling and -buying are on the rise again. Dunavant reports that credit recoveries have fallen below 70 percent.

A.4 The dysfunctional contract enforcement system in rural areas and the need to reduce transaction costs has caused the ginning companies to adopt different strategies to organize farmers in groups and recover their investments. Dunavant's distributor scheme involves appointing village-based agents ("distributors") who work on commission to recruit and contract farmers, distribute inputs, monitor crops, recover credits, and ensure that all of the cotton produced by the farmers under their responsibility is delivered to the company. Distributors are monitored by company staff. The company maintains a central registry of all contract farmers listing their personal details, the area contracted, and inputs provided.

A.5 The contact farmer scheme is similar to the distributor scheme but provides credit to groups of farmers, who are jointly responsible for repaying the debt. The contact farmer is the liaison between farmers and the company but is not responsible for disbursing inputs or recovering credits. This system has been adopted by Cargill (Clark) Cotton, ZCMT, and Continental Ginnery.



**Figure A.1: Structure of the cotton industry in Zambia**

Source: GDS 2006

Note: Excludes yarn exports from Zambia. Includes large-scale commercial farmers producing seed cotton under irrigation, but although this may have been the case previously, all cotton currently produced in Zambia is grown by smallholders. AGOA = African Growth and Opportunity Act.

**Table A.1: Ginning companies operating in Zambia as of 2005/06**

Company	Ownership	Capacity (t/season)
Dunavant	Multinational	> 115,000
Cargill	Multinational	60,000
Great Lakes	Multinational (Plexus)	10,000
Alliance Cotton	Multinational (Alliance Cotton)	na
Continental	Local	25,000
Mulungushi	Zambian/Chinese	10,000
Chipata-China Cotton Ginnery (CCC)	Chinese	15,000
Mukuba	Local	500
Birchand Oil Mills	Tanzanian	0
<b>Total</b>		<b>&gt; 215,500</b>

Source: Tschirley and Kabwe 2007

Note: na = not available

### **Institutions**

A.6 The CAZ, a semiautonomous association formed in 2005, is affiliated with the ZNFU. It provides an organized body for farmers to work with the Zambia Cotton Ginners' Association (ZGCA) on key issues affecting smallholders. Previously stakeholders were represented under the Oil Seeds Committee of the ZNFU, but in view of the importance of cotton in Zambia, responsibility was devolved to a separate Cotton Committee, which evolved into the CAZ. The CAZ still is a very young organization and is fully dependent on donor support (Dutch, Swedish, Smallholder Enterprise and Marketing Programme–Agribusiness Development Component, and Cordaid). Many smallholder cotton farmers are not yet aware of its existence.

A.7 All ginners in Zambia belong to the ZCGA. The ZCGA consists of its members (the ginners) and representatives from ZNFU, MACO, the Cotton Development Trust (CDT), and the Textile Producers Association. Its main functions are to liaise between outgrower schemes to minimize side-selling, to develop strategies to expand cotton production (area and yields), to assess market price trends, and to liaise on prices, especially for local spinners.

A.8 The recently created (March 2007) Zambia Cotton Outgrower Pre-financiers Association (ZACOPA) safeguards the interests of established ginners that pre-finance inputs in their outgrower schemes and attempts to prevent side-selling and side-buying.

A.9 The CDT, formed in November 1999 by MACO, is a semiautonomous, grant-dependent organization, funded mainly by MACO through its Soil Crop Research Branch (SCRB). The CDT aims to develop agriculture in Zambia by strengthening the cotton subsector, mainly through research and development, while ensuring that pure cotton seed is available for farmers through a cotton maintenance breeding program, which produces breeder and prebasic seed for multiplication by the ginneries or contract farmers.

### **Legislation/regulation**

A.10 The major players in the cotton sector, organized under ZACOPA, have worked with MACO and CAZ to propose extensive revisions to the 2005 Cotton Act. The main revisions include the balance between public and private sector representation on the Cotton Board, the handling of appeals, clarification and proper use of terminology related to cotton production and marketing, the removal of inconsistencies between various penalties, and making licenses available for two years rather than one, to encompass the entire cropping, ginning, and marketing

cycle. Agreement on and swift implementation of revisions would be in the interest of all stakeholders.

A.11 The Agricultural Credit Act regulates credit default, but given the high prevalence of default in the industry, better local mechanisms for contract enforcement are needed. For example, under the Agricultural Credit Act, the penalty for defaulting on a contract is the value of the inputs provided, when the value of the crop secured against the loan would be more appropriate.

A.12 The government supports the cotton industry through MACO's Outgrower Support Fund, which offers funds (partial loans) to supplement the private sector's efforts to supply inputs, extension, and farmer training. Although the CDT found that the funds increased production, the number of cotton growers, incomes, and employment, the program was able to reach only 2.64 percent of cotton farmers in 2002/03 and 7.95 percent in 2003/04. Some observers maintain that the criteria for distributing the funds are unclear. The 2004/05 allocations to the two largest companies, Dunavant and Clark, financed only 1–2 percent of the area they had covered in the previous year, whereas allocations to smaller companies were substantially larger relative to their previous area. Overall, an increase in funding and a more transparent disbursement process seem warranted.

#### **COSTS AND RETURNS**

A.13 The value chain for cotton is typical: cotton is grown under contract, picked, transported to a ginnery for processing, and then shipped to Durban in South Africa for export. There are three main cotton farming systems, characterized by different levels of yields and management: low-yielding (600 kilograms per hectare), medium-yielding (1,200 kilograms per hectare), and high-yielding (1,800 kilograms per hectares).

##### **At the farm level**

A.14 At all yield levels, cotton production under an outgrower system is profitable. Farmers earn from US\$79 to US\$343 per hectare (Table A.2). Profit margins range from 50 percent for low-yielding systems, 68 percent for medium-yielding systems, and 73 percent for high-yielding systems. Farmers who attain medium yields would have a profit margin of 73 percent if they engaged in side-selling (assuming that the side-buying price is only K 20 per kilogram above the outgrower price). Naturally, the profit rises if the side-buyer pays more. In 2002, the markup was between K 100 and 130 per kilogram, depending on the grade, showing that such large differentials do occur.

A.15 Figure A.2 shows the costs and returns at the farm level for medium yield levels produced by farmers in an outgrower scheme. Chemicals comprise the largest component of the farm-gate price (23 percent), followed by hired labor (7 percent), transport, and seed (both 1 percent). Baling is paid by the outgrower, so only the economic cost of actually transporting the bales to the depot is included in the farm budget. Under low and high yields, the composition of costs does not change significantly, except that ordinary farmers do not hire labor.

##### **At the processing level**

A.16 In assessing costs and returns for cotton processing, it is assumed that the chain concentrates on ginning seed cotton to separate the lint from the seed (which is sold for animal

feed). Figure A.3 shows the breakdown of costs for processing and distributing cotton. At 1 percent, the profit for this activity is only marginal for ginners in Zambia.<sup>12</sup>

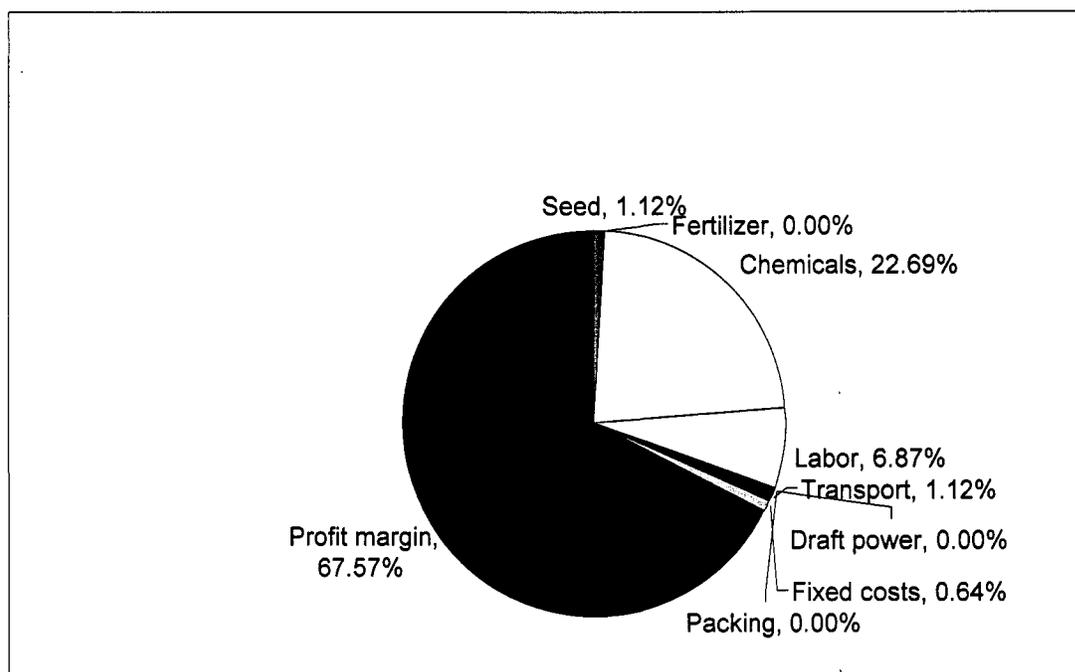
A.17 Clearly the purchase of raw material is the highest cost at this stage of the value chain. Transport costs are also significant, constituting 29 percent of the FOB price. It is interesting to note that the cost of organizing the outgrower schemes (8 percent) is higher than the cost of the core activity at this stage, the actual processing cost (7 percent).

**Table A.2: Farm-level benefits for cotton outgrowers at three yield levels**

	Low yield	Medium yield	High yield
Return to family labor (US\$/d)	0.65	1.71	2.77
Net profit (US\$/ha)	79	212	343
Profit margin (%)	50	68	73

Source: Study team calculations

Note: For yield values see Table 2

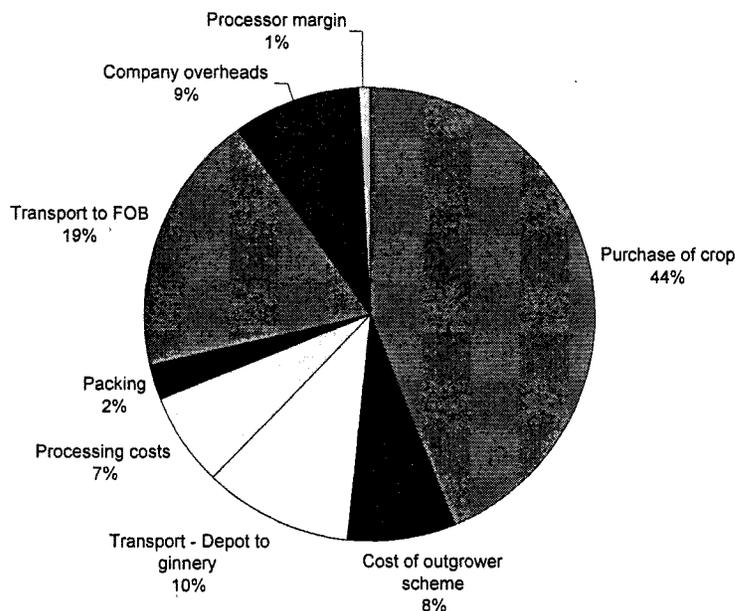


Source: Study team calculations

Note: For yield values see Table 2

**Figure A.2: Farm-level costs and returns for cotton farmers obtaining medium yields in an outgrower scheme**

<sup>12</sup> Indeed, ginners such as Dunavant claim that in 2006/07 they posted a loss.



**Figure A.3: Cost of processing and distributing cotton from outgrower schemes**

*Source:* Study team calculations

A.18 Generally, it costs more to operate contact farmer outgrower schemes than distributor schemes, because additional extension and field staff are required to organize procurement. These additional procurement costs are significant when averaged over the entire harvest procured by the companies and comprise a substantial financial burden. Interviews with Continental Ginneries revealed that in 2006/07 Continental abandoned the contact farmer scheme for the distributor scheme to reduce the cost of its outgrower support. Side-buying is more profitable than outgrower schemes because companies avoid the costs of managing farmers and avoid paying district levies at checkpoints by using side-roads.

A.19 Whether contract farmers obtain high or low yields has no influence on processing costs, since these costs are calculated per kilogram and thus do not vary with yield levels. Given the significant overcapacity of ginneries, and the fact that most of their costs such as labor are relatively fixed, reasonable changes in yields are not expected to have much of an effect on processing costs.

### **Total value chain**

A.20 Table A.3 shows the values of all cost items for the whole cotton value chain as percentage of total value chain cost. The total transport cost accounts for almost 30% of overall cost. Interestingly the cost of managing the outgrower scheme is higher than the actual processing cost. Note that farmer margins are not returns to family labor, as the opportunity cost of labor is fully included in this calculation. Farmer margins could therefore rather be interpreted as net returns to family capital.

**Table A.3: Cotton value chain costs under medium yields**

Cost item		Share of total costs (%)
Land preparation		
	Labor	2.5
	Oxen	0.0
Production		
	Seed	0.5
	Labor	8.5
	Fertilizer	0.0
	Pesticide (including sprayer)	9.9
Harvesting		
	Labor	5.3
	Packing	0.0
	Transport	0.5
Fixed costs		0.5
Farmer margin (net return to family capital)		16.1
Cost of outgrower scheme		
	Extension and field staff	4.0
	Distributor incentives	2.0
	Distribution of inputs	1.6
	Overheads	0.3
Transport from depot to ginnery		
	District levies	0.4
	Transport	10.0
Processing costs		
	Electricity (ginning)	0.4
	Wages (ginning)	3.3
	Repairs and maintenance	1.8
	Tractors, forklifts, and other equipment	0.1
	Overheads	0.7
	Administration	0.4
Packing		
	Lint	1.1
	Fuzzy seed	1.4
Transport to FOB		
	Lint	14.0
	Fuzzy seed	4.8
Company overheads		
	Interest and finance	7.2
	Administration	1.0
	Overheads (rent, office, vehicles)	0.8
Processor margin		0.9
	Lint	0.4
	Fuzzy seed	0.5

Source: Study team calculations

Note: For yield values see Table 2. Family labor valued at US\$0.75 per day

## ANNEX B: THE BURLEY TOBACCO VALUE CHAIN

### GOVERNANCE

#### Organization

B.1 Most smallholder tobacco is Burley tobacco, grown in Eastern Province under contract with four companies: Alliance One (Stancam/Dimon), Zambia Leaf Tobacco Company (ZLTC), Africa Leaf (Zambia), and Tombwe Processing Limited. Tombwe is the only tobacco processor operating in Zambia. The other firms only purchase tobacco and either ship the unprocessed leaf to Malawi or Zimbabwe or process small amounts through the Tombwe facility for a fixed charge (currently US\$0.30 per kilogram of green leaf).

B.2 Companies cannot purchase tobacco without a license from the government. To obtain a license, the buyer must sponsor a minimum tobacco production area (currently 50 hectares in a prescribed area). Sponsoring involves providing inputs on credit to smallholders under an outgrower arrangement. Companies then use the purchasing license to procure well over the quantity of tobacco produced in the sponsored area (Table B.1).

**Table B.1: Tobacco outgrowers in Eastern Province, 2006/07**

Company	Number of permanent staff	Number of smallholders sponsored	Area sponsored (ha)	Estimated production (kg) <sup>a</sup>	Tobacco purchased 2006/07(kg)
Alliance One	140	8,000	3,600	3,600,000	3,200,000
Africa Leaf	6	1,000	350	350,000	700,000
Zambia Leaf	5	28	54	54,000	800,000

*Source:* Alliance One, personal communication

*Note:* Does not include small sponsors, such as Eastern Fodya and others

<sup>a</sup> Based on an average Burley tobacco yield of 1,000 kg/ha

B.3 Some of the tobacco growers in Eastern Province operate under tenant farmer schemes. Alliance One leases land<sup>13</sup> from TBZ to operate its Zemba Tobacco Scheme, in which tenant farmers work 2 hectares on average. The array of crops they can grow is restricted to prevent pests and diseases from moving to tobacco from other crops, especially cotton.

B.4 Tobacco outgrowers—whether they are tenant farmers or work their own land—are organized in different ways. For example, farmers contracted by Alliance One are required to join a farmer group with collective responsibility for repaying loans. Tombwe employs scheme operators who use their own funds to run the outgrower scheme and collect the harvest. The scheme operator receives a commission from Tombwe, which also covers the costs of transporting the harvested tobacco to Lusaka. Scheme operators protect themselves against defaulting farmers by organizing the farmers into groups (for example, of 10 farmers). The scheme operator may withhold part of a group's payment for the tobacco crop if some of the farmers in that group have failed to repay their loans.

B.5 Normally nearly all tobacco grown near the Malawian border is sold over Zambian buying floors and then shipped to Lilongwe. In Malawi, three firms control most tobacco procurement (versus 16 in Zimbabwe): Limbe Leaf, Dimon, and Standard Commercial–Alliance

<sup>13</sup> Originally owned by the National Tobacco Company (NATCO), TBZ's forerunner.



number of auction floors (from 96 to only 11) has made it more difficult for them to market their produce.

B.9 Prices for different grades of tobacco are set by the tobacco companies at the beginning of the buying season. Before the bales reach the floor, buyers and sellers have already agreed to enter the selling process on an exclusive basis, so the sale is really a negotiation over the grade of the leaf being sold.

B.10 Side-marketing and informal trade are significant in Eastern Province. Chipata is close to Malawi and Mozambique, so traders easily enter Zambia to source sponsored tobacco. Alliance One estimated that it lost approximately 500,000 kilograms of tobacco to side-marketing in 2006/07, and significantly reduced its investment in 2007/08 (Table B.2)

**Table B.2: Impact of tobacco side-selling on Alliance One's investment in Zambia**

	2006/07	2007/08 (planned)
Number of farmers sponsored	8,000	100
Area sponsored (ha)	3,600	50
Fertilizer distributed (t)	2,160	120
Value of inputs (US\$m)	1.7	0.1
Cost of repairs and maintenance for transport (US\$)	200,000	15,000
Number of permanent staff	140	7
Number of seasonal staff	600	30

*Source:* Study team interviews

## **Institutions**

B.11 As in the cotton industry, most smallholder tobacco growers participate in the value chain through loosely organized interest groups. Although most farmers have a commercial interest in growing tobacco with one company or another, as a group their interests do not extend beyond this point. Farmers' interests may shift from year to year. For example, a farmer may decide not to grow tobacco but another cash or food crop, or to grow tobacco with another company.

B.12 Unlike the cotton industry, in the tobacco industry very few organizations link tobacco farmers to the value chain. The Central Growers Association for Virginia tobacco is quite successful, in contrast to the Eastern Fodya Association for Burley tobacco growers, whose constituent farmers expressed serious discontent.

B.13 TAZ was formed in 1964 as the Virginia Tobacco Association of Zambia (VTAZ). Among its objectives were to promote and support research and training to ensure the industry's continued development and expansion. VTAZ was also responsible for linkages with training and research organizations, including the Tobacco Research Board (TRB) and the Blackfordby Agricultural Institute of Zimbabwe. TAZ currently employs a small number of extension officers, but smallholder farmers consider their number inadequate.

B.14 The parastatal TBZ, established by Parliament to regulate the tobacco industry, participates in a regional body with Malawi, Mozambique, Tanzania, and Zimbabwe to share experiences, reduce price collusion by buyers, and harmonize tobacco legislation. Like TAZ, it is insufficiently staffed, employing too few inspectors to monitor and regulate the industry adequately.

## Legislation/regulation

B.15 The licensing system for tobacco buyers has already been described. Some support for growers is available from MACO's Outgrower Support Fund, but as with cotton, the impact has been limited. To stop the surge of credit default in the industry, local enforcement of the Agricultural Credit Act must be strengthened (for example, by increasing the penalty for defaulters from the value of the inputs provided to the value of the crop secured against the loan).

## COST AND RETURNS

B.16 Based on the fieldwork and secondary sources, a Value Chain Analysis Tool was constructed in Excel for Zambia's smallholder tobacco industry. Results are available for: (1) smallholder flue-cured Virginia, transported to Tombwe for processing and shipped to Durban for export; (2) smallholder flue-cured Virginia, transported to Harare for processing and shipped to the port for export; and (3) smallholder Burley, transported to Lilongwe for processing and shipped to the port for export. Here only the results for Burley production are presented, as it is the most important type of tobacco for smallholders.

### Farm level

B.17 Burley production is profitable at all yield levels (Table B.3). Net profits range from US\$274 to US\$1,329 per hectare. Returns to family labor are quite high at medium to high yield levels (profit margins reach 61 percent for high yields). If smallholder Burley producers can achieve adequate yields and continue to receive outgrower services, Burley will remain an attractive option. Overheads and administration (15.3 percent) and fertilizer (17 percent) are smallholders' largest cost factors (Figure B.2).

### Processing level

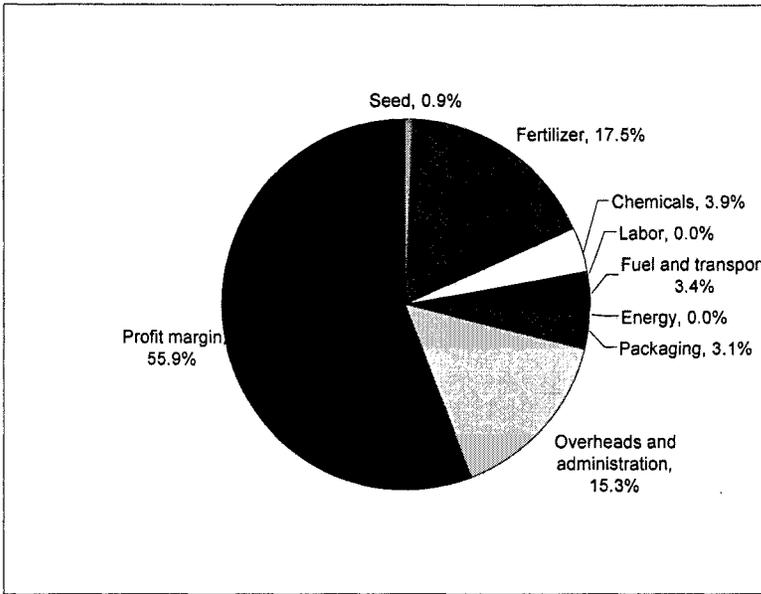
B.18 Figure B.3 shows the breakdown of tobacco processing and distribution costs. Clearly the cost of organizing outgrower schemes represents a very large share of total costs, comparable to processing costs. Participation in Zambia's smallholder Burley value chain is relatively profitable for buyers within Zambia who sell into the Malawian value chain. Burley production is concentrated in Eastern Province, where high transportation costs and lack of infrastructure curtail production and access to markets. The high costs of transportation to Lusaka make it cheaper to source tobacco from Central and Southern Provinces (which grow mostly Virginia tobacco).

**Table B.3: Farm-level benefits for Burley tobacco outgrowers at three yield levels**

	Low yield	Medium yield	High yield
Return to family labor (US\$/d)	0.68	2.44	3.32
Net profit (US\$/ha)	274	978	1,329
Profit margin (%)	31	56	61

*Source:* Study team calculations

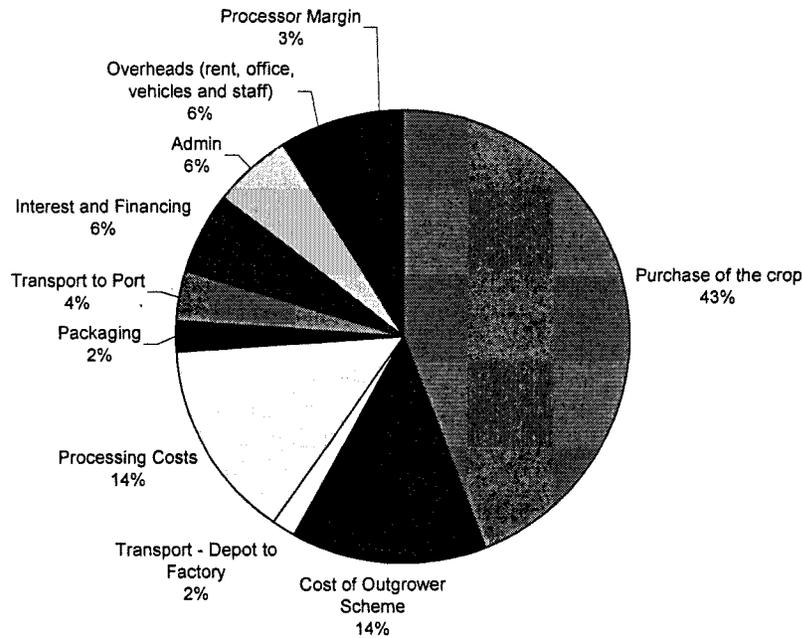
*Note:* For yield values see Table 2.



**Figure B.2: Farm-level costs for smallholder Burley tobacco production at medium yield level**

*Source:* Study team calculations

*Note:* For yield values, see Table 2



**Figure B.3: Processing and distribution costs for smallholder Burley tobacco grown in Zambia and processed in Malawi**

*Source:* Study team calculations

## Total value chain

B.19 Table B.4 shows the values of all cost items for the whole burley tobacco value chain as percentage of total value chain cost. Interestingly the cost of managing the outgrower scheme is as high as the actual processing cost. Note that farmer margins are not returns to family labor, as the opportunity cost of labor is fully included in this calculation. Farmer margins could therefore rather be interpreted as net returns to family capital.

**Table B.4: Burley tobacco value chain costs under medium yields**

Cost item	Share of total costs (%)
<b>Seedbed preparation</b>	
Seed	0.4
Fertilizer	0.2
Chemicals	0.4
<b>Production</b>	
Fertilizer	7.5
Herbicides	0.0
Nematicides	0.0
Chemicals	0.7
Suckerides	0.6
Packing	1.4
Labor	7.7
Fuel	0.0
<b>Curing</b>	
Fuel (wood/coal)	0.0
Electricity	0.0
<b>Transport</b>	
Fertilizer	0.6
Chemicals	0.0
Tobacco (farm to sale)	0.9
<b>Fixed costs</b>	
Repairs and maintenance	2.2
Repairs/buildings	4.4
Levies and charges	0.1
Overheads and miscellaneous	0.0
Farmer margin (net return to family capital)	17.0
<b>Cost of outgrower scheme</b>	
Management and extension	8.1
Finance, handling, and overheads	5.9
<b>Transport (depot to factory)</b>	
Loading	0.2
Transport	1.4
Unloading	0.0
<b>Processing costs</b>	
Electricity	3.6
Coal	1.2
Labor and direct management	2.4
Repairs and maintenance	2.4
Overheads and investment	4.4
Packaging	2.2

Transport to port	3.6
Interest and financing	5.9
Administration	5.6
Overheads (rent, office, vehicles, and staff)	5.6
Processor margin	3.4

*Source:* Study team calculations

*Note:* For yield values see Table 2. Family labor valued at US\$0.75 per day

## ANNEX C: THE SUGAR VALUE CHAIN

### GOVERNANCE

#### Organization

C.1 In 2006, ZSC crushed 1.8 million tons of cane, including deliveries from its own estate and outgrowers, for a record 239,000 tons of processed sugar. Around 92,000 tons (38 percent) of this output was sold into the domestic market,<sup>14</sup> and 147,000 tons (62 percent) was exported (and accounted for more than 90 percent of all Zambian sugar exports). ZSC is undertaking a major expansion, and by 2009 production of processed sugar is expected to increase by 85 percent, from 239,000 to 440,000 tons.

C.2 In addition to ZSC, two new sugar projects have been set up by private investors within the past five years. The first is a relatively small project near Kasama in Northern Province (Kalungwishi Estates, at 500 hectares), where lower irrigation costs and closer proximity to markets in the Great Lakes region are likely to be significant advantages. The second (Kafue Sugar, at 2,000 hectares) is on the other side of the Kafue River from Nakambala and came into production in 2005/06. Both operations have their own facilities for crushing cane and producing refined sugar.

C.3 ZSC classifies its outgrowers as follows:

- <10 hectares: Smallholder farmers (161 smallholders operate under KASCOL).
- 10–100 hectares: Medium-scale farmers (4), some with center-pivot irrigation systems.
- 100–1,100 hectares: Commercial farmers (3, including KASCOL), with center-pivot irrigation and flood irrigation.

C.4 In the Nakambala scheme, KASCOL is responsible for harvesting both the KASCOL core estate and outgrowers' cane. The commercial growers are responsible for delivering their own cane, as is ZSC, with its own estate. All three types of delivery need to be coordinated with the ZSC mill to ensure that daily deliveries meet target mill operations. KASCOL is responsible for transporting the cane but outsources that task to a local transporter.

C.5 The cane supply agreement between ZSC and KASCOL has been in force since 1990 and is open-ended, although it is currently under revision. Stakeholders are discussing the introduction of quotas based on volume rather than area planted. KASCOL and the large-scale commercial growers have the same agreement with ZSC.

C.6 The 161 outgrower farmers are organized under the Kaleya Smallholder Farmers' Association (KASFA), which was recently transformed into the Kaleya Smallholder Trust (KST) to facilitate the transfer of shares to smallholders. KASFA was established in October 1990 as a forum for the smallholders in the scheme to represent their interests.

C.7 ZSC provides irrigation water, two extension officers, and agronomic services. KASCOL provides a range of field management services to outgrowers, including land preparation, replanting, input procurement and provision, irrigation water supply, grower extension, and cane transport. Cane cutting has been outsourced to KASFA so that it can generate income (this

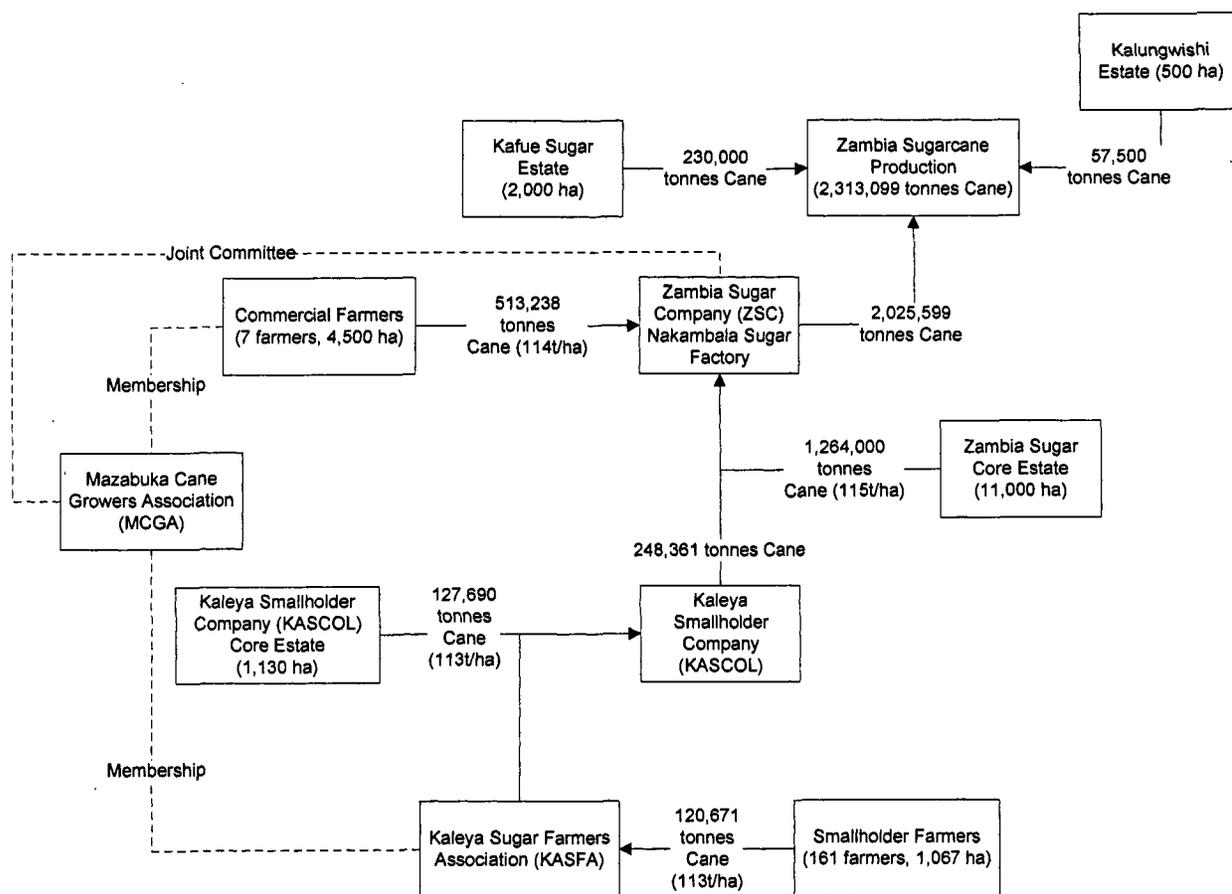
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<sup>14</sup> Mainly to industrial clients such as Coca-Cola.

activity, like cane transport, is regarded by the company as a noncore activity). KASCOL also provides crop insurance for growers, notably against malicious cane fire, flooding, and drought, and it also grades the main outgrower roads up to several times a year. Parallel to the sublease, farmers sign a Cane Supply Agreement, which stipulates good crop husbandry requirements for farmers and describes the division of responsibilities and rights between the grower and KASCOL. The agreement includes a code of conduct that farmers must follow or risk being expelled from the scheme.

C.8 In principle KASFA was to offer a range of social services, including farmer coordination and management, domestic water supply, health and education services, emergency credit, and funeral assistance. In practice, many of the services were provided by KASCOL, but lately the company has been withdrawing from these services, which has caused tension towards KASCOL within KASFA.

C.9 Figure C.1 depicts the structure of sugarcane production in Zambia.



**Figure C.1: Production of sugarcane in Zambia, 2006/07**

Source: Study team analysis

Note: "Tonnes" refers to metric tons.

C.10 The price of processed sugar is K 1,265,000 per ton (US\$316.25, at K 4,000 per US\$1) and is directly related to the sugarcane price. Outgrowers get paid approximately US\$41 per ton of sugarcane (calculated on yields of approximately 110 tons per hectare). This payment depends

on the sugar price, the estimated recoverable crystals (ERC),<sup>15</sup> and the division of proceeds (DoP) formula. The distribution of payment is 59 percent to the grower and 41 percent to the miller (5.2 percent and 7.9 percent of the ERC, respectively) and is renegotiated every five years.

C.11 More than half (57 percent) of the payment going to KASCOL is retained for company operations, and 43 percent goes to the farmers (4.5 percent and 3.4 percent of the ERC, respectively), less KASFA deductions. Thus every 100 tons of sugarcane brings a payment to farmers that equals the price of 3.4 tons of sugar. The grower is paid 50 percent of his/her net proceeds when the cane is delivered (from the 92 percent ZSC installment at delivery), and the remaining 50 percent is staggered over the following 11 months to assist the grower in cash flow management.

C.12 A potential area of conflict between KASFA and KASCOL is that the cost of KASCOL's individual services—covered by the 57 percent of proceeds that are retained—is not clear. Discussions with smallholder cane farmers suggest that friction between farmers, KASFA, KASCOL, and ZSC is steadily increasing. Smallholders view KASCOL with a high level of mistrust, feel excluded from making basic decisions, and feel a complete lack of control over their livelihoods. The nature of the complaints and alternative views indicate that the main problem is a lack of transparency and communication between the parties. Now that the association has become a trust that owns KASCOL shares, growers will obtain voting rights as full members of the KASCOL board (versus the observer status they had as an association) and should get access to the full cost breakdown.

### **Institutions**

C.13 The MCGA is the apex organization for KASCOL, KASFA, and large-scale commercial growers in the Mazabuka area. The association has no paid staff. MCGA and ZSC have a joint committee where issues of importance are raised.

### **Legislation/regulation**

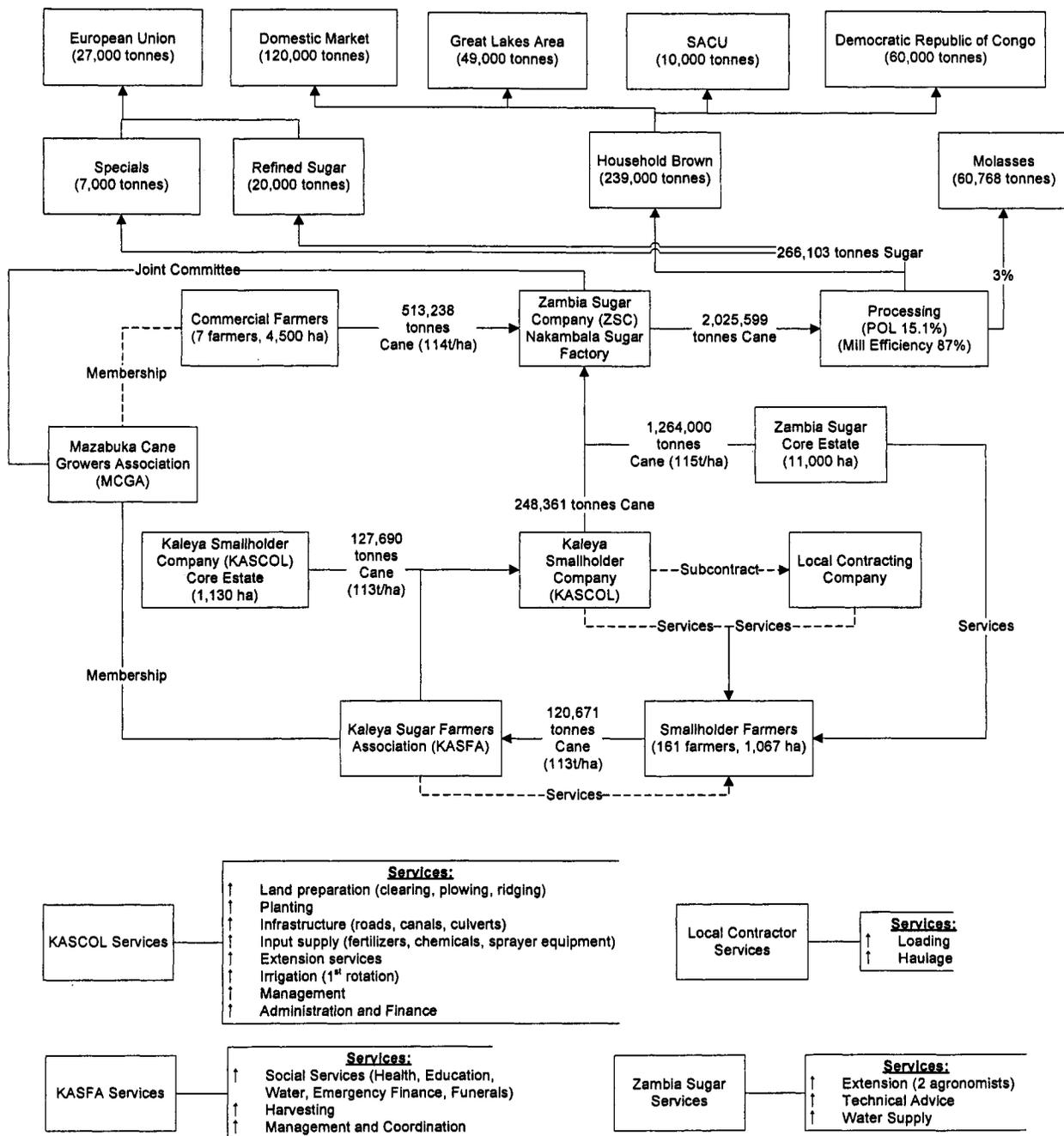
C.14 In terms of government policies, the single most important issue is the adoption of the new Energy Policy, in particular with regard to alternative sources of energy such as biodiesels and (in the case of sugar) bioethanol. Operators eagerly await the government policy on blending as a means of import substitution.

### **COST AND RETURNS**

C.15 The three main sugarcane production systems are characterized by differences in ownership rather than by any underlying agro-economic or yield differences: commercial estates, cooperative estates (or smallholder estates under the KASCOL smallholder company), and smallholder farms (outgrowers). Based on the fieldwork and secondary sources, a Value Chain Analysis Tool for the sugar industry in Zambia was constructed in Excel. Only the ZSC value chain (Figure C.2) was analyzed, because it accounts for 90 percent of the sugar produced in Zambia and is the only one with any production by small-scale outgrowers. After smallholders grow and harvest the crop, the cane is transported to ZSC's Nakambala factory for processing into various products and then exported or consumed domestically.

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<sup>15</sup> The ERC is the product of the sucrose content of the cane (which currently averages 15.1 percent but is no higher than 15.42 percent) times the mill efficiency rate (currently averaging 87 percent).



**Figure C.2: Supply chain for sugar under Zambia Sugar Company**

Source: Study team analysis

Note: Pol = sucrose level in raw cane.

## Farm level

C.16 The farm budgets exclude the cost of planting, which is done every 5–6 years (but can extend to as many as 10 years). The costs, which would need to be amortized over the interplanting period, were not available. In any event they would be almost identical for every kind of enterprise and do not affect the comparison of profitability.<sup>16</sup>

C.17 Under all yield scenarios, sugarcane production is highly profitable for smallholders in KASCOL's Nakambala scheme. Even when smallholders' yields are low, sugarcane production is still highly profitable at US\$929 per hectare (Table C.1). (However, KASCOL itself loses US\$40 per hectare, because the division of proceeds from the Nakambala mill does not cover their production costs.) At medium yield levels (average yields in KASCOL's Nakambala scheme), sugarcane production is also highly profitable for smallholders at US \$1,270 per hectare, with an additional profit of US\$361 per hectare going to KASCOL. Finally, the high yield (and most profitable) scenarios are indicative of newly planted cane in the first to third ratoon. KASCOL smallholders who obtain high yields obtain profits of around US\$1,420 per hectare, with an additional profit of US\$535 per hectare going to KASCOL.

C.18 For smallholder farmers the returns are much higher for sugarcane than for other activities. Figure C.3 shows the breakdown of costs at the farm level for sugarcane production under medium yield levels.

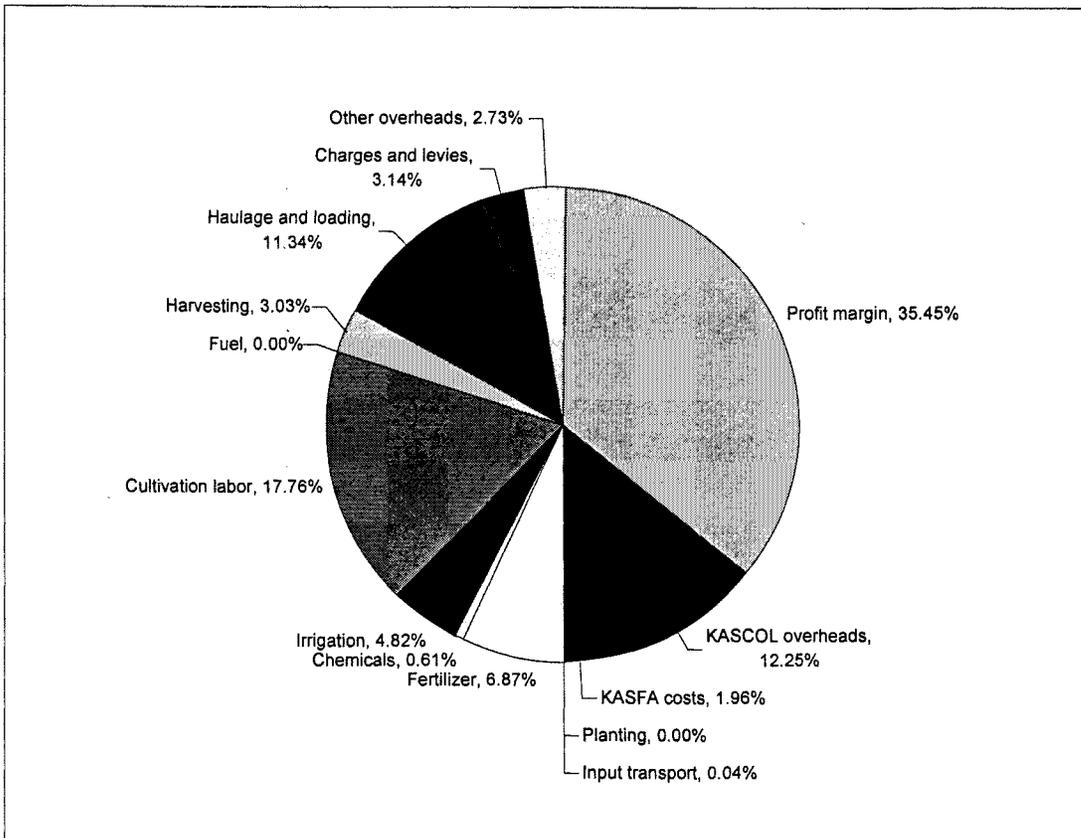
**Table C.1: Farm-level benefits from sugarcane produced by outgrowers at three yield levels**

	Low	Medium	High
Return to family labor (US\$/d)	134	183	204
Net profit (US\$/ha)	937	1,279	1,428
Profit margin (%)	24	35	39

Source: Study team calculations

Note: For yield values see Table 2

<sup>16</sup> They would be useful if alternative crops need to be evaluated, but under the estate production system and KASCOL, farmers cannot use the land to grow crops other than sugarcane; if they wish to do so, they have to vacate the farm.



**Figure C.3: Farm-level costs for smallholder sugarcane production under medium yields**

*Source:* Study team calculations

*Note:* For yield values see Table 2

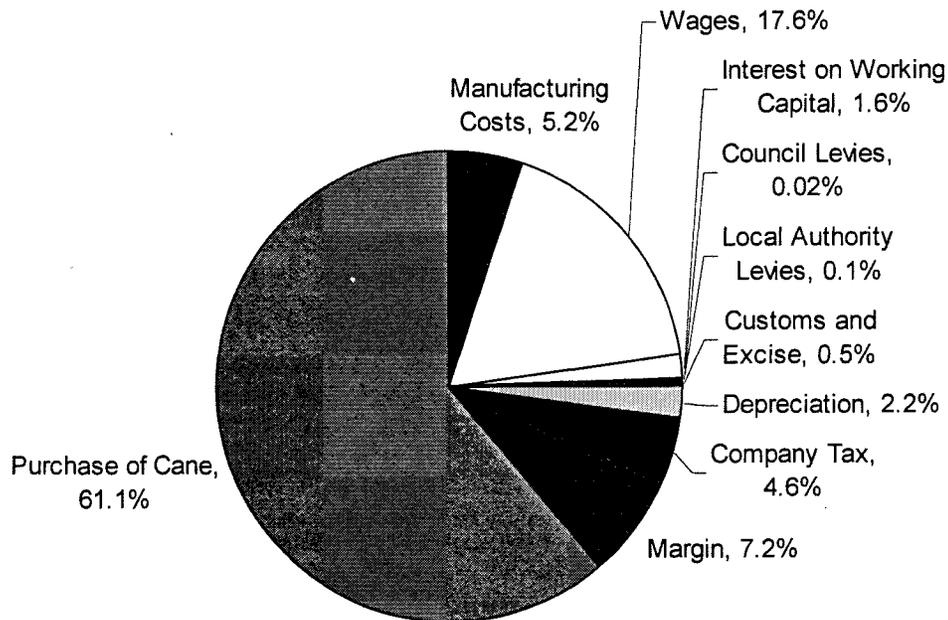
### Processing level

C.19 Although three value chains were investigated (commercial estate, smallholder estate, and smallholder farm), there are no substantive differences between the chains on the processing side, so only results for the smallholder farm chain are reported here.

C.20 Sugarcane costs approximately US\$15.26 per ton to process, which translates into a processed sugar value of around US\$432–434 per ton, depending on the sugarcane purchase price (which depends in turn on the ERC and the division of proceeds formula). Overheads comprise US\$46–47 per ton of sugar, resulting in a profit margin of US\$37–38 on the final FOB price of US\$517.47 per ton.<sup>17</sup>

<sup>17</sup> The final FOB price of US\$517.47 per ton translates back into a price of US\$0.235 per pound for sugar, which is substantially above the international price of sugar. The main reason for this difference is that African sugar gets preferential access to the EU market under the Everything but Arms and Africa, Caribbean, and Pacific protocols as well as to the US and Southern African Development Community (SADC) markets (mainly into DRC). While the world price averaged around US\$0.10 per pound in late 2006 and early 2007, Illovo reported an average return on US\$0.1492 per pound for their African operations, with an estimated premium for Zambian sugar of US\$0.086 per pound; resulting in the final price of US\$0.235 per pound (US\$517.47 per ton).

C.21 The breakdown of processing and distribution costs (Figure C.4) for sugarcane from smallholder farms indicates that processing is profitable for ZSC. Of the final FOB price, the profit margin is 7.2 percent. The purchase of cane is the largest single cost item (61.1 percent of the final FOB price), followed by wages, manufacturing costs, company tax, depreciation, interest payments on working capital, and duties and levies.



**Figure C.4: Processing costs for sugarcane from smallholder farms**

*Source:* Study team calculations

### **Total value chain**

C.22 Table C.2 shows the values of all cost items for the whole sugar value chain as percentage of total value chain cost. Among the largest cost factors are cultivation labor, wages, and farmer margins. Note that farmer margins are not returns to family labor, as the opportunity cost of labor is fully included in this calculation. Farmer margins could therefore rather be interpreted as net returns to family capital.

**Table C.2: Sugar value chain costs under medium yields (113 t/ha)**

Cost item		Share of total costs (%)
<b>Production</b>		
	Input transport	0.02
	Fertilizer	4.2
	Chemicals	0.4
	Irrigation water	0.7
	Irrigation electricity	2.2
	Cultivation labor	10.9
	Fertilizer/herbicide labor	0.1
	Fuel	0.0
<b>Harvesting</b>		
	Labor	1.9
	Haulage and loading	6.9
<b>Fixed costs and overheads</b>		
	Zambia Revenue Authority tax	1.8
	Crop insurance	0.03
	District cane levy	0.1
<b>Scheme management and extension</b>		
	KASFA membership	0.5
	KASFA clinic	0.1
	KASFA school bus	0.6
	KASCOL extension	0.5
	KASCOL share purchase	1.7
<b>KASCOL overheads</b>		
	Financial charges	0.1
	Overheads	6.9
<b>Margins</b>		
	Farmer (net return to family capital)	16.8
	KASCOL	4.8
<b>Processing costs</b>		
	Manufacturing costs	5.2
	Wages	17.6
	Interest on working capital	1.6
	Council levies	0.02
	Local authority levies	0.1
	Customs and excise	0.5
	Depreciation	2.2
	Company tax	4.6
<b>Processor margin</b>		7.2

Source: Study team calculations

Note: Family labor valued at US\$0.75 per day

## ANNEX D: THE DOMESTIC HORTICULTURE VALUE CHAIN

### GOVERNANCE

#### Organization

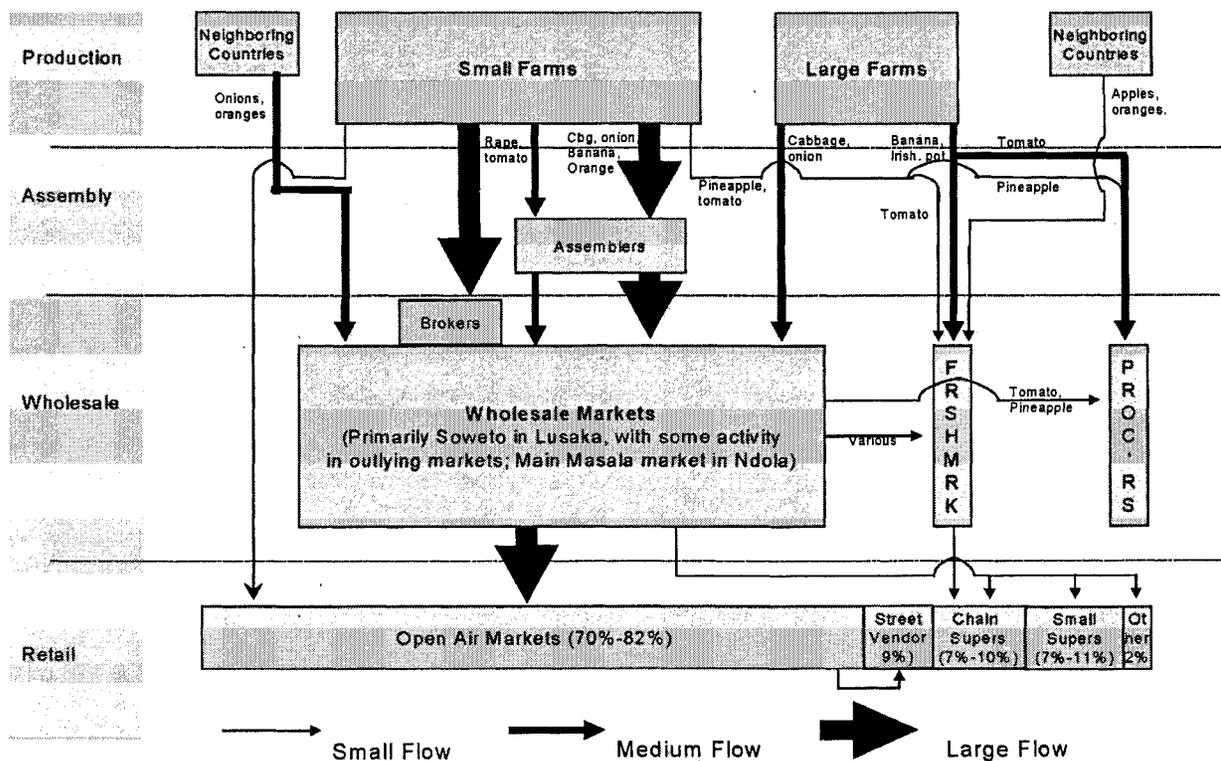
D.1 Horticultural crops grown for domestic consumers—generally vegetables but also fruit—are marketed through two chains: the extremely fragmented, informal marketing chain, in which large numbers of agents operate at each level, and the formal, organized marketing chain.

D.2 In the informal chain, small-scale farmers grow horticultural crops for sale in wholesale and open-air markets. The retailers sort and grade the produce, setting aside unripe produce for sale at a later stage. The produce is usually sold for a fixed price and there is no bargaining.

D.3 A recurrent theme in interviews with vegetable producers is that markets for horticultural crops are poorly developed and prices are volatile. Price discovery mechanisms are not transparent, so per unit transaction costs are high and farmers are at a considerable disadvantage in marketing their own produce. Most farmers rely on itinerant traders (“assemblers”) to purchase produce at the farm gate and take it to the city for sale, although smallholders frequently bring their tomato and rape crops to Lusaka, where they usually sell to brokers (who charge a commission) rather than directly to wholesalers.

D.4 The organized marketing chains operated by supermarkets provide an alternative to trading through the public markets. An important intermediary is FreshMark, which is owned by the same parent company as Shoprite. About 75 percent of FreshMark’s business is to supply produce to the 18 Shoprite stores throughout Zambia; the rest is sold to other grocery stores and informal traders. FreshMark also exports some Zambian produce to Shoprite stores in Uganda, Malawi, and even South Africa. FreshMark imposes standards and puts a high premium on quality. It sources about 40 percent of the produce it trades directly from local sources—mainly large-scale commercial farmers but also other domestic sources. The remaining produce is imported, mostly from South Africa and Zimbabwe, partly because it is cheaper than locally grown commodities.

D.5 Figure D.1 shows how horticultural produce flows into Lusaka (Hichaambwa and Tschirley 2006); a map for Ndola would look similar. The map distinguishes between “small,” “medium,” and “large” flows of produce and, where possible, indicates the primary items flowing through each channel. Hichaambwa and Tschirley’s (2006) qualitative classification of the size of each flow was based on information from large farms, first sellers in wholesale markets, retail traders, and consumers. Boxes in the map, indicating major market segments, are drawn only to approximate size at the farm and wholesale levels, because quantitative data are not available. At the retail level, preliminary estimates of the market shares for different outlets exist and are indicated.



**Figure D.1: Simplified supply chain map of Lusaka's fresh fruit and vegetable system**

Source: Hichaambwa and Tschirley 2006

D.6 In the future, supermarkets could play a critical role in the vegetable product value chain. These firms represent a very attractive market because they are reliable and pay better prices to producers, but their share of the retail market for vegetable crops is still small in Zambia. Even though food retailing accounts for 90 percent of the sales in supermarkets such as Shoprite, supermarkets still have only a minor role in marketing agricultural produce in Zambia. Key informants estimated that other market channels, including the farm gate, street vendors, and other local markets, provide more than 75 percent of crops such as tomatoes and potatoes to consumers.

D.7 FreshMark and Shoprite, as well as hotels and lodges, have sought to source produce from smallholders under a number of cooperative arrangements, but these attempts failed. The main problems were that smallholders could not supply sufficient quantities, the quality of the produce was also unreliable, and there was no system to trace produce supplied by smallholders. Until smallholders overcome these hurdles, their prospects for accessing this high-end market are remote. These producers are better off attempting to access more traditional market outlets within the surrounding district.

### Institutions

D.8 Markets in Zambia can be managed by the City Council or Marketeer Cooperatives, though some in the Ministry of Local Government and Housing have suggested that all markets legally belong to the City Council. Disagreements between the City Council and Marketeer Cooperatives over how the markets are managed, how marketeer fees are used, and who has title to the land have been at the center of serious disputes in recent years.

D.9 Most of the Lusaka City Council markets, such as Matero and Chilenje, were council taverns used for selling opaque beer. After that business ceased, community members formed marketer cooperatives and built stalls in the taverns for selling fresh produce and other products. These markets were eventually taken over by the City Council, because they owned the structures. The markets are managed by the City Council through its Market Advisory Committees and by the marketers through their cooperatives. Marketers pay daily levies to the City Council and contribute to their respective cooperatives.

D.10 Still other markets have been developed by community members, who put up the infrastructure (of varying permanence) and formed cooperatives to run them. These “cooperative markets” mostly do not pay levies to the City Council, and any monies collected are used for the benefit of the members. The Lusaka Union of Marketer Co-operatives, the umbrella body of these markets in Lusaka, welcomed the government’s recent decision to introduce market management boards as long as its membership was not sidelined in the process. Land tenure is an additional concern of marketers. In many cases, cooperatives lack titles to the land on which they operate, and the traders are therefore subject to the risk of eviction.

### **Legislation/regulation**

D.11 The EU-funded Urban Markets Development Program (UMDP) is a major effort to improve urban marketing in Zambia by improving physical infrastructure and promoting a new market management model. The model—the core of the program—emphasizes much more active participation by stakeholders (primarily traders but also communities) in upgrading and managing markets through Market Management Boards, which will function as counterparts to the public administration. The program also seeks to orient public officials towards greater facilitation of healthy commercial activity. To this end, one component of the program is to review and revise legislation and bylaws for local markets.

D.12 The Markets Act is widely perceived as a barrier to this more participatory and decentralized approach. Although revision of the Markets Act is therefore a high priority, the specific revisions proposed for the Act are not yet publicly available, and marketer representatives are concerned that the new Act will not fully meet the needs of the trading community. In light of past conflicts between marketers and public officials, complete openness in revising this key legislation is warranted.

### **COSTS AND RETURNS**

#### **Farm level**

D.13 The profitability of horticultural crops depends very much on the particular crop, the area, the season, prevailing prices, and management practices. It is beyond the scope of this study to develop partial budgets for each horticultural crop. Instead, indicative budgets are provided for farmers and traders in the tomato and watermelon value chains. More specifically, the first example is a tomato producer who sells his produce to an intermediary, who then sells it in the wholesale market. The second example is a watermelon producer who sells his product at a wholesale market and does not use an intermediary. Results are presented in Table D.1.

**Table D.1: Farmer benefits from domestic horticulture: two examples**

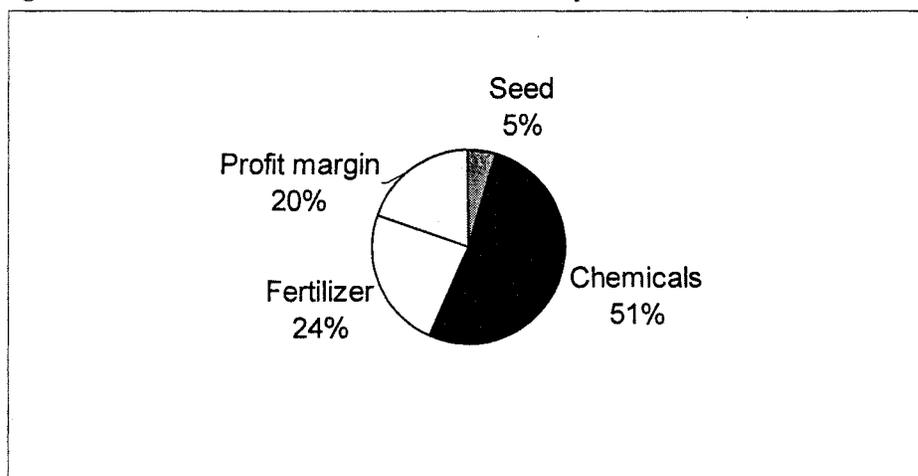
	Tomato production	Watermelon production and trade
Return to family labor (US\$/d)	1.94	5.99
Net profit (US\$/ha)	99	538
Profit margin (%)	20	36

*Source:* Study team calculations

D.14 Both activities are profitable: the tomato farmer earns US\$99 per hectare, and the watermelon farmer earns US\$538 per hectare. Watermelon is clearly a high-value crop with high returns for the farmer. Note, however, that the watermelon returns also include the return to marketing.

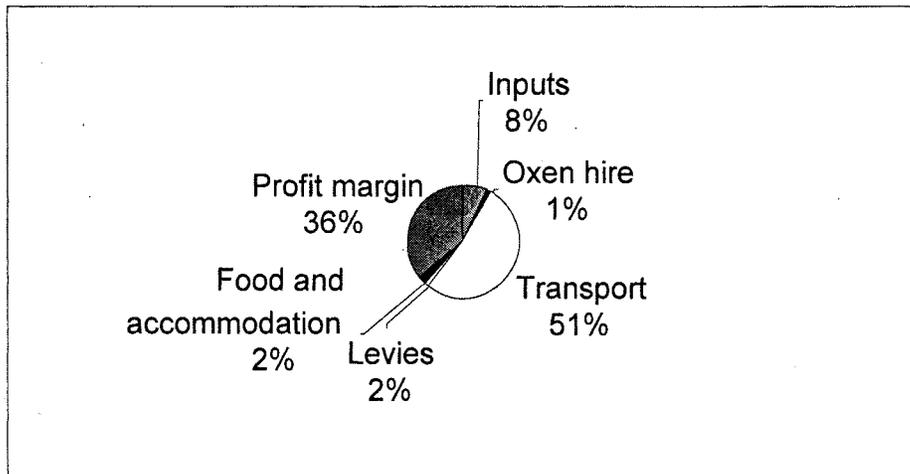
D.15 Figures D.2 and D.3 show farm-level costs for the tomato and watermelon producers. Tomato production requires high cash outlays for inputs. Although input costs are also important for watermelon production, they account only for a small share of the cost of bringing the product to market—transport costs plays a far greater role. Although watermelon production is very profitable for the farmer, a more coordinated assembly system would offer considerable scope for reducing transport costs.

**Figure D.2: Farm-level costs for smallholder tomato production**



*Source:* Study team calculations

**Figure D.3: Farm-level costs for smallholder watermelon production and trade**

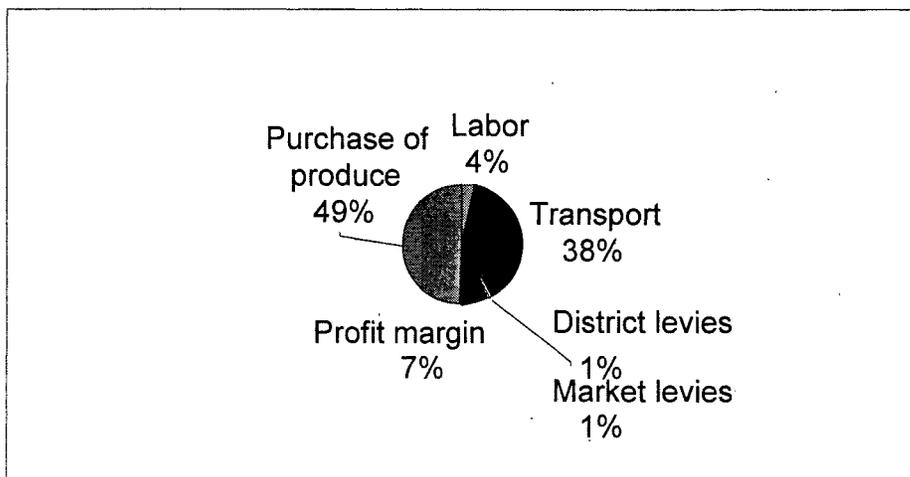


Source: Study team calculations

**Trader level**

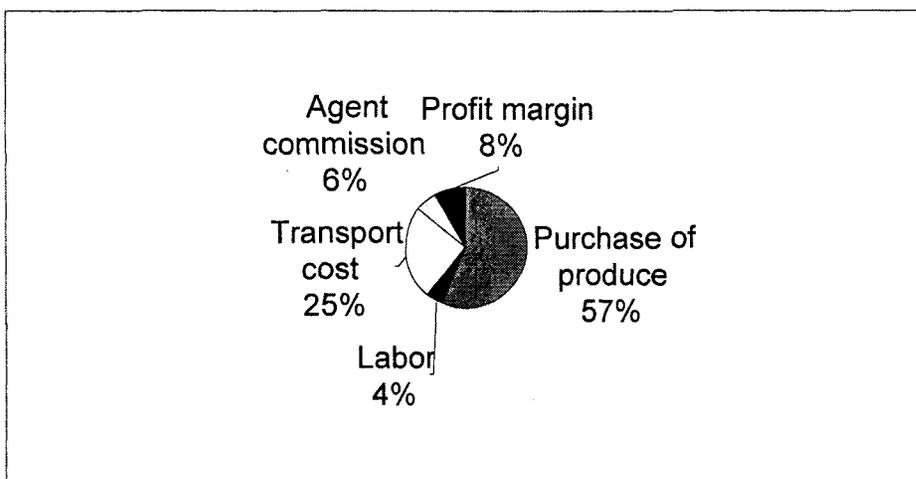
D.16 The study team determined the costs and returns for (i) an assembler who buys tomatoes at the farm gate, transports them to the market, and acts as a wholesaler and (ii) for an assembler who buys tomatoes at the farm gate and sells them via a commission agent, who takes a flat percentage of the sale price. Figures D.4 and D.5 show that in both cases, the assemblers incur the highest costs in purchasing produce and transporting it to the market. Their profit margins are between 7 and 8 percent.

D.17 Although these results are for a high sale price, markets for horticultural crops are poorly developed and prices fluctuate considerably. Vegetable prices can often be very low. Interviews with traders indicate that depending on supply and demand, the price per crate can range between K 10,000 and K 20,000. Traders break even at around K 18,550. If the price drops to K 15,000–10,000, traders incur losses of 85 and 23 percent.



**Figure D.4: Wholesaler costs and benefits from tomato sales**

Source: Study team calculations



**Figure D.5: Costs and benefits for an assembler selling tomatoes through a commission agent**  
*Source: Study team calculations*

### Total value chain

D.18 Table D.2 and D.3 show the values of all cost items for the whole watermelon and tomato value chains as a percentage of total value chain cost. The highest cost items are transport cost (truck hire) and input costs. Note that farmer margins are not returns to family labor, as the opportunity cost of labor is fully included in this calculation. Farmer margins could therefore rather be interpreted as net returns to family capital.

**Table D.2: Value chain costs for watermelon farmer and trader**

Cost item	Percent of total
Seeds	0.54
Fertilizer (Super D)	3.89
Pesticide (Ballpark)	0.39
Pesticide (Diethen)	2.18
Land preparation	2.18
Plowing	0.43
Planting	0.08
Weeding at 14 d	0.93
Weeding at 44 d	0.47
Fertilizer application (first)	0.31
Fertilizer application (second)	0.31
Pesticide application	1.56
Harvesting	0.62
Loading	0.23
Truck rental	46.71
District levy	0.62
Market levy	0.93
Unloading	0.23
Food and accommodation	1.96
Margin (net return to family capital)	26.15

*Source:* Study team calculations

*Note:* Based on two-hectare plot; family labor valued at full daily wage rate for casual labor

**Table D.3: Value chain costs for tomato farmer selling to assembler/traders in Main Marsala B Market, Ndola**

Cost item	Percent of total
Seeds	2.50
Fertilizer (Super D)	6.00
Fertilizer (Urea)	6.00
Pesticide (Metaphos)	4.38
Pesticide (Uthane)	12.50
Pesticide (Sticker)	5.00
Sprayer hire	3.75
Nursery establishment	0.75
Land preparation	1.75
Leveling	1.25
Weeding	2.63
Farmer margin (net return to family capital)	3.50
District levies	0.75
Truck hire	37.50
Worker wages	3.75
Market fee	0.75
Trader margin	7.25

*Source:* Study team calculations

*Note:* Based on 0.25-hectare plot producing 200 crates of tomatoes, assuming a high price; family labor valued at full daily wage rate for casual labor.





