

## Research Article

### An Assessment of the Growth Opportunities and Constraints in Zambia's Cotton Industry

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**Abstract:** The main objective of this study was to assess the major opportunities and constraints in Zambia's cotton industry. The study found that the cotton sector has considerable potential to contribute to growth and employment in Zambia as it currently accounts for direct and indirect employment of approximately 21% of the population and about 19% of agricultural Gross Domestic Product. The prominence of smallholder farmers in the sector is indicative of the income equity promotion potential of the cotton sector. However, the highly concentrated structure of the sector, with two key players currently accounting for about 80% of the total market share in ginning; the absence of regulatory mechanisms for setting of prices; the openness of the local market to global price fluctuations and the lack of support programmes as compared to competing crops like maize are major impediments to equity promotion in the sector. Overall growth of the cotton sector is also constrained by low productivity arising mostly from poor farming practices. Furthermore, increased production in major world markets due to subsidies and use of bio-technology in cotton production undermine the competitiveness of Zambia's cotton in international markets. For Zambia to realize the potential of the cotton sector, interventions need to be targeted at raising farm level productivity. The government should also facilitate informed policy debate and development on critical issues such as biotechnology adoption as well as facilitating consensus between cotton buyers and farmers on price setting mechanisms.

**Keywords:** Cotton industry, diversification, employment creation, sustainable economic growth, value Chain analysis, Zambia

## INTRODUCTION

Zambia is one of the few countries in Africa which is abundantly endowed in terms of land, labour and water resources. Based on this endowment, the country has great potential to expand its agricultural production and provide linkages with other industries. Out of the country's total land area of 75 million hectares (752,000 km<sup>2</sup>), 58% or 42 million hectares falls under the medium to high potential for purposes of agricultural production (Government of the Republic of Zambia, 2006, 2004).

Zambia has a comparative advantage in the production of a wide range of food and non-food crops, however, it has not capitalised on this comparative advantage to increase production across a wide range of products. This is partly due to unfavourable policy options, lack of capacity and resources to exploit these advantages. In recent years however, production of crops such as maize, cotton, flowers, fruits and vegetables has increased but the comparative advantages in terms of livestock, fisheries and forestry have not been systematically harnessed. To a large

extent the Zambian agricultural economy remains largely a mono economy dominated by maize production (Government of the Republic of Zambia, 2011; World Bank, 2007).

Zambia's future development will depend significantly on the diversification of the economy. Most stakeholders believe that the best prospects for diversification are currently found within the agricultural sector given Zambia's natural resource endowment. Historically, Zambia's agriculture sector has been dominated by maize production. However, there is considerable potential for expansion in respect of a number of other agricultural products. Research evidence has shown that varieties of agricultural products are or have the potential to be internationally competitive and have great potential for growth and employment creation. One such crop is cotton which is mainly produced by smallholder farmers (Government of the Republic of Zambia, 2004). The main objective of this study was to carry out a situational analysis of the cotton industry in Zambia. The study specifically identified major actors in Zambia's cotton industry as well as assesses the major opportunities and constraints in the cotton industry or value chain. In so doing, the

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study aimed at providing an in depth analysis of the key issues and challenges faced by the cotton industry with a view of assessing the growth opportunities and employment creation potential of the cotton industry in Zambia.

## METHODOLOGY

**Analytical framework:** The study employed a Value Chain Analysis (VCA) approach. The VCA is one of the many tools that have been used in analyzing markets with the aim of contributing to the process of linking rural industries and enterprises into the mainstream markets (Asia DHRRA, 2008). This provides useful information that can help policy-makers to harness and maximize the benefits of the value chain as well as aid in developing strategic linkages between commodity producers, market players and consumers. As defined by Kaplinsky and Morris (2001), the value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (i.e., involving combinations of physical transformation and the input of several producer services), delivery to final consumers and final disposal after use. The essence of VCA is to improve strategic learning in enterprise development as it treats the enterprise not as a singular (autonomous) entity, but as part of an integrated chain of economic functions and linkages across geographical boundaries.

The VCA seeks to understand the various factors that drive the incentives, growth and competitiveness within a particular industry and identify opportunities and constraints to increasing benefits for stakeholders operating throughout the industry. This feature of VCA lends to its completeness as a strategic tool in exploring different alternative strategies for poverty reduction (Asia DHRRA, 2008). The purpose of analyzing the value chain of sugar was to identify key points of intervention along the chain and to recommend specific policy directions to enhance the competitiveness of the cotton industry. This study took a descriptive approach to map the cotton value chain and identify the major actors and the functions they perform as well as identify major constraints and opportunities in the chain.

**Data collection:** Both secondary and primary data was used in the study. The data was gathered through desk research and key informant interviews. Secondary data was collected through a review of published and unpublished material including past value chain studies, academic thesis, relevant websites and other documents.

Key informant interviews were carried out with leaders in the cotton industry or sector. Additional sources with a detailed knowledge of growth and investment opportunities including the producers' associations and government officials were also consulted for relevant information. Focus of the semi-structured key informant interviews was on the specific

research objectives as outlined above and to highlight any pertinent issues concerning the cotton industry in Zambia.

**Data analysis:** For purposes of this study, descriptive data analysis was employed to characterize the cotton industry in Zambia. The data collected was analyzed to identify the main actors, characterize the key structure or elements of Zambia's cotton value chain. Quantitative and qualitative data collected from documents and key informants was also analyzed to assess the opportunities for enhancing growth of the cotton industry and the constraints hampering growth of the industry. A descriptive-analytical narrative was used to present the findings from the study in order to have a comprehensive picture of the key issues concerning the cotton industry in Zambia.

## RESULTS AND DISCUSSION

**Overview of the global cotton market:** Despite its low share in global trade, cotton trade is very important to many poor countries, especially in Sub-Saharan Africa where an estimated 2 million rural poor households depend on the commodity. Since the 1960s cotton production grew at 1.8% annually to reach 24 million tons in 2005 from 10.2 million tons in 1960 (Darity, 2008). Most of this growth came from China and India the leading textile producers in the world. The United States, Central Asia and Francophone Africa dominate the export market accounting for more than two-thirds of global trade. Cotton has been subject to various marketing and trade interventions; typically taxation in low income countries, especially sub-Saharan Africa and Central Asia and subsidization by rich countries, especially the United States and the European Union (EU). The subsidization has had a very profound effect on the world cotton prices as these countries have been able to produce large volumes of cotton that they have dumped on the world market leading to depressed prices. Technological advancements in the lead exporting countries by way of adoption of Genetically Modified (GM) cotton have led to even greater increases in the production of cotton by these countries.

**Importance of cotton industry in Zambia:** Zambia is the second largest cotton producer in the Southern African region after Zimbabwe. Zambian cotton is almost entirely produced by smallholder farmers and at its peak (2005), there were 280,000 households selling seed cotton, which is about 35% of the national smallholder farmer population (ACI and Agridev Consult, 2008). Eastern Province (Lundazi, Chipata, Chadiza, Katete and Petauke) is the most important region in terms of cotton production and accounts for about 70% of Zambia's total output, with parts of Central, Lusaka and Southern provinces accounting for the balance (Keyser, 2007). In terms of value, it accounted for 32% of the value of the main agricultural exports while in terms of Gross Domestic Product

(GDP), cotton accounted for around 19% of total agricultural GDP. For the 2010/2011 season, cotton production was 63,000 metric tonnes of lint (about 150,000 metric tonnes of seed cotton) as a result of the improved producer prices. For the same period, there were about 272,000 contracted farmers. Cotton provides direct and indirect employment to an estimated 21% of the population and directly supports the livelihood of over 1.4 million people. Long-term prospects for growth are promising as Zambian cotton receives some of the highest premiums in Africa (Kabwe, 2011).

Cotton generates significant commercial activity throughout the economy and value chain, including import and distribution of inputs, the provision of extension services to farmers by companies, cotton seed ginning, exportation of lint and unprocessed cotton seed and processed oil, as well as oilcake and soap production. This section comprehensively discusses growth and employment potential in respect of cotton in Zambia by analyzing the market from a value chain perspective.

**Structure of the cotton value Chain in Zambia:** The cotton value chain in Zambia mainly consists of the ginners, smallholder farmers and seed oil processors as direct players. Inputs are mainly supplied by the ginners through farmer distributors which primarily include chemicals and cotton seed (which they multiply using selected smallholder farmers using foundation seed developed by the Cotton Development Trust (CDT)). These ginners currently numbering (5) also supply specialized cotton extension as well as marketing services. The second level of the chain includes the Seed cotton farmers who are usually organized in out

grower schemes contracted to particular ginners. These usually vary in numbers depending on cotton prices offered in the previous season as well as incentives being offered for producing competing crops such as tobacco and maize. However, in high production years, they have numbered up to 300,000. The seed cotton produced is then supplied to the ginners who had provided financing through inputs and extension. They then clean and separate cotton lint from seed and export. A less prominent part of the chain are the seed oil processors who in certain instances happen to be the same Ginners who process cotton seed into edible oils and animal feeds. Figure 1 illustrates a simplified value chain.

Although currently there are (5) registered cotton ginning companies with a ginning capacity of about 120 metric tonnes of lint (Mwale, 2011), two companies remain the dominant players in the Zambia cotton sector and accounted for about 80% market share as at 2009 making it to be classified as a concentrated system (Tschirley and Kabwe, 2010). Furthermore, these ginneries have always operated below their full capacity (about 40%). During interviews with one of the stakeholders, a particular reason given for low utilization of the ginning capacity was the low supply of cotton seed which results from low production. Whereas privatization of the sector resulted in an increase in the number of cotton ginning companies, there has not been corresponding efforts (especially from government) in the development of the smallholder cotton farmers who are the main suppliers of seed cotton. Discussions held with stakeholders indicated that as at 2011, Dunavant was the key player, while the others included Continental, Chipata-China Cotton, Alliance Cotton and Africotton ginneries.

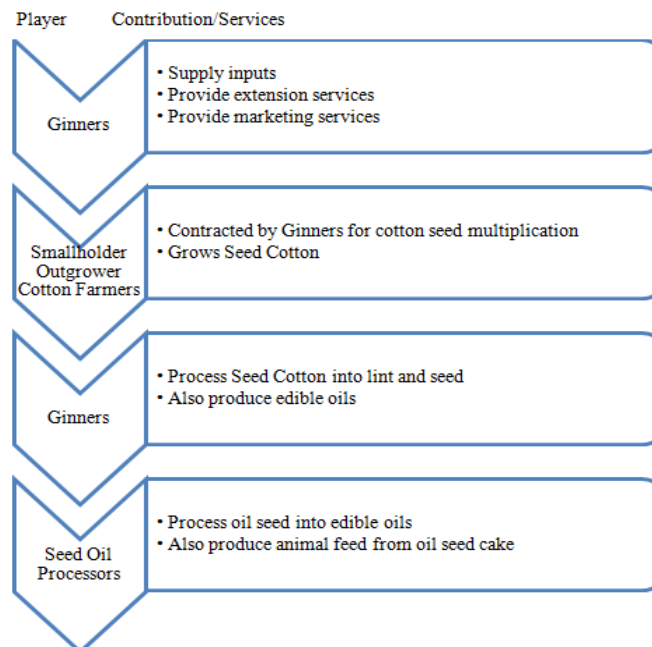


Fig. 1: Zambia cotton value chain

According to Tschirley and Kabwe (2007), cotton sectors in Sub-Saharan Africa can be organized in a wide variety of fashions. These range from publicly-owned national monopolies; local monopolies in which private firms hold monopoly rights in defined geographical zones; concentrated market-based sectors in which 2-3 private firms dominate the cotton market; competitive sectors in which many private firms compete vigorously for seed cotton; and hybrid sectors which combine elements of different types. Tschirley and Kabwe (2010) furthermore show that the prices and services received by the cotton producers are related to the prevailing market system. Competitive market systems are expected to deliver attractive seed cotton prices to producers, but are rarely able to deliver input credit or achieve high lint quality while concentrated market systems are expected to deliver some input credit and also achieve higher lint quality but over time are expected to deliver lower seed cotton prices to producers compared to competitive systems. The prices delivered under the concentrated system are also known to depend very much on the behaviour of the dominant companies (Tschirley and Kabwe, 2007).

**Regulation and Governance:** Although currently the Zambia does not have specific policies regulating the operations of the players in the cotton industry, the industry is still considered to be well organized. Regulation of the sector is conducted under the auspices of the Cotton Act of 2005 and the Ministry of Agriculture and Livestock (MAL) is mandated to oversee and manage regulation and governance. The regulatory institutions include the Cotton Board which has been provided for in the Cotton Act and was established in 2009. This board has nine voting members appointed by the Minister of Agriculture and Livestock upon nomination by their own institutions. The proposed members come from industry relevant institutions such as the Permanent Secretary of the Ministry of Agriculture and Livestock (MAL), two persons each from the Cotton Development Trust (CDT), the Cotton Ginners' Association (CGA) and Cotton Growers' Association, the Controller of Seeds (one person) and one person from the Environmental Council of Zambia (ECZ). The specific stated functions of the Board include to:

- Regulate the production, processing and marketing of cotton
- Advise government on regulations and policies related to the sector
- Monitor and report on implementation of policies and matters related to the sector
- Carry out such activities as are necessary to the better performance of its functions

Other than the Board, there are other institutions such as the Cotton Association of Zambia (CAZ), Zambia Cotton Ginner's Association (ZCGA), Zambia

Cotton Outgrower Pre-financiers Association (ZACOPA) and the CDT. These institutions have particularly played important roles in providing opportunities through production support schemes detailed under the section on opportunities for growth for the sector.

**Production trends:** Although there are very few commercial farmers who are involved in seed multiplication, seed cotton in Zambia is almost wholly produced by the smallholder farmers. The majority cultivate an average of less than one hectare under a rain fed production system (Kabwe, 2011). Cotton production trends in Zambia have exhibited variations depending on the price fluctuations which is the key determinant of production. Year on year variations in production respond to lagged prices and are usually as a result of farmers increasing the area under production in response to the previous years' prices as well as new farmers producing the crop. Figure 2 shows the trends in cotton production (in metric tons) since liberalization of the sector in 1994.

Liberalization of the cotton sector in 1994 resulted in an increase in seed cotton production from 20,000 metric tonnes to 110,000 metric tonnes around 1998. However, due to lack of regulation in the sector which led to rampant credit default, production went down to 42,000 metric tonnes a mere two years later. Between 2000 and 2005, the sector recovered with production reaching a record high of almost 200,000 metric tonnes of cotton seed produced by about 300,000 smallholder farmers. According to Tschirley and Kabwe (2007), there were multiple drivers for this unprecedented production increase. Firstly, the Distributor System first launched by Dunavant (2005), was greatly refined which subsequently dramatically improved credit repayment rates among farmers prompting Dunavant to aggressively expand its production network. Clark Cotton, the other large cotton company operating in Zambia at the time, also improved from its traditional system and was able to increase production while maintaining its repayment rates. Consequently, national production more than quadrupled between 2000 and 2005, driven by yield growth in addition to area expansion. Furthermore, by resolving the issue of propylene contamination, which had threatened the country's export market, Zambian cotton received a premium on world markets which trickled down to farmers, hence high producer prices, despite the country operating in a concentrated sector.

Production went down again to approximately 83,000 metric tonnes in the 2006/2007 season as a result of macro-economic instability, low international prices and credit default. Since 2002, the Zambian *Kwacha* steadily appreciated against the dollar placing the export sector under increasing pressure. By 2005 the *Kwacha* appreciation proceeded more rapidly causing a serious crisis in all export sectors. For instance, the cotton outgrower companies who had purchased inputs around June/July 2005 when the

exchange rate was at ZMK4, 700/US\$1 based their input prices at that exchange rate. The *Kwacha* then began to appreciate and by May 2006 the exchange rate was down to ZMK3, 200/US\$1. In this environment, Dunavant indicated that it mobilized the local currency at the low exchange rates and announced that it would pay only ZMK860/kg down from ZMK1, 200/kg from the previous year (Tschirley and Kabwe, 2007). As a result, cotton planting for the 2006/2007 growing season fell by 40%. This also eroded farmer confidence to such an extent that even when the pre-production prices were increased, farmers could not respond. Whereas there appeared to be some progression again in 2008/2009 season, production was only approximately 73, 000 metric tonnes (Kabwe, 2011). However, the 2010/2011 season saw improvement in production to 150, 000 metric tonnes of seed cotton which has been attributed to improved producer prices (Mwale, 2011). The stakeholders interviewed believe that as a result of good producer prices, the 2010/2011 production could have been higher had it not been for the droughts experienced in some cotton growing areas during the planting period.

According to the Global Development Solutions (2007), the Zambian climate and its general altitude of 750-1200 m above sea level creates an environment quite favourable for growing cotton. Furthermore, potential for growth is high as cotton buyers appreciate the quality of Zambian cotton because it is hand-picked making it cleaner and less prone to damages on the fibres compared to machine picked cotton (Tschirley and Kabwe, 2010; Global Development Solutions, 2007). However, the principal reason given for the relatively continued good performance of the cotton sector is that the two major cotton ginning companies do an excellent job in providing inputs and crop

collection through their out grower programs where they provide finance, production inputs and extension services (Tschirley and Kabwe, 2010; Global Development Solutions, 2007; ACI and Agridev Consult, 2008). Even though in the recent past, production has not responded that much to increases in prices due to competition with maize which has been receiving increasing amounts of subsidized inputs from the government under the Farmer Input Support Programme (FISP) as well as guaranteed market under the Food Reserve Agency (FRA), the observed delays/failure to pay farmers for maize supplied by the FRA implies that cotton may again be the only crop for which farmers receive advance credit for inputs while at the same time having a definite market and an expected price. This makes producers view it as a well-financed, low risk opportunity and consequently even if they could make more money growing other crops, they would still prefer to grow cotton.

Cotton production is also highly responsive its own prices as well as prices of other competing crops such as tobacco. Based on prices paid in the previous year, existing farmers expand areas under production while new farmers also grow the crop. Therefore, based on the high prices of US\$0.66/kg paid for the year 2010/2011 season, the 2011/2012 production is expected to rise. In terms of future outlook for the cotton market, Dalberg (2011) shows that cotton prices are expected to fall by the end of 2011 and to continue to ease, although at a much slower rate, towards 2015, owing to higher cotton production in both 2011/12 and 2012/13 and the more long-term switch to man-made fibres (Fig. 3).

Considering that the growth in cotton production in Zambia has been highly responsive to international

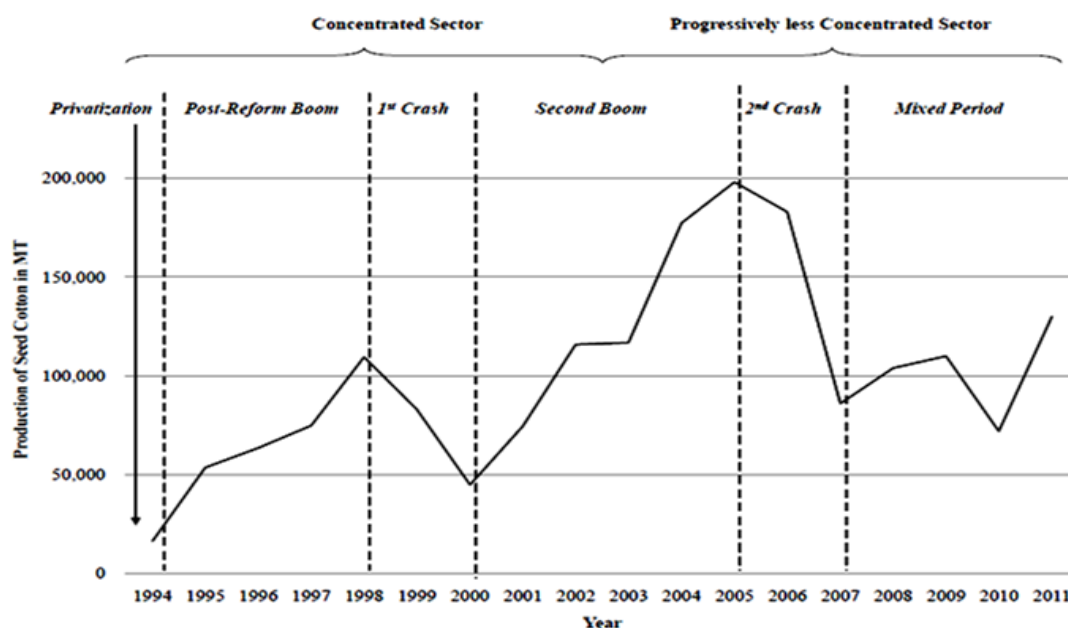


Fig. 2: Cotton production trends in Zambia from 1994 to 2011; Kabwe (2011)

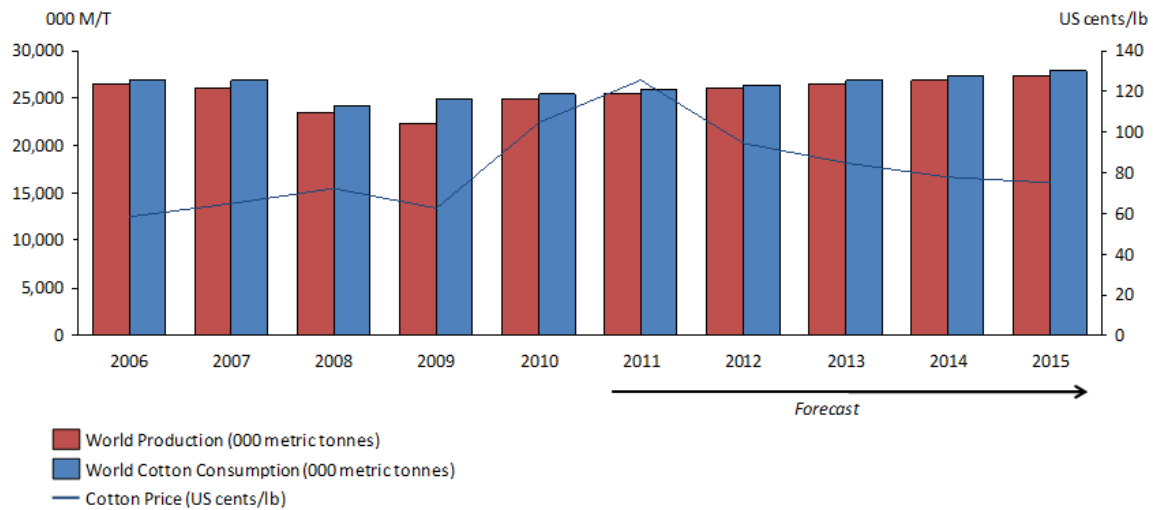


Fig. 3: Five-year forecast on world cotton production, consumption and prices (2011-2015); Dalberg (2011)

prices, it can be projected that national production is also going to decline in response to world prices. However, this projection is based on the assumption that there is an insignificant increase in efforts by cotton companies and government to raise farmer productivity which could raise production despite falling world prices.

**Drivers of projected growth in cotton production:**

Between 2000 and 2005, there was significant increase in land area used to plant cotton as a result of contract farming arrangements, whereby smallholder farmers received inputs on credit and extension assistance from private sector processing and marketing companies, along with guaranteed output markets. The expansion of cotton production was almost entirely the result of ever increasing numbers of farmers becoming involved in outgrower schemes, up to approximately 280,000 in the 2004/2005 season, with Dunavant accounting for some 180,000 smallholder farmers. There was hardly an increase in the average yields, which remained stagnant (reportedly due to poor farming practices) at slightly below 600 kg/ha (ACI and Agridev Consult, 2008).

Since 2006, there has been a change in approach to increasing cotton production pioneered by Dunavant which has entailed coming up with programmes that stimulate productivity. Since then a number of programmes aimed at improving productivity have been recorded while productivity rises are also being cited in certain areas (i.e., among those farmers who are under the YIELD programme, the ACI and Agridev Consult (2008) report yield increases of up to 1200 kg/ha being recorded. Since 2006, Dunavant has been running programmes aimed at increasing cotton yields for the farmers and make the crop more profitable. For instance, they are running a yield programme which aims to raise not only cotton productivity but also profitability by teaching farmers business skills. They

are also operating a mechanization scheme, under which farmers are given tractors to enable them increase the land under cotton production as well as improve the timelines of land preparation and hence increase yields. Dunavant is promoting the use of herbicides to ease the constraint of weeding (which takes up a substantial amount of time for cotton farmers) thus raising hectareage, yields as well as improving the quality of cotton produced. They are also supporting research in high yielding cotton varieties under the Cotton Development Trust (CDT). According to some stakeholders, on average, cotton yields have risen from about 500 kg/ha to 750 kg/ha and are likely to rise even more as a result of these efforts, with the target standing at 1,200 kg/ha. As such, this increased productivity and the projected increase in the number of farmers growing the crop in the coming years is going to raise the national cotton production.

**Employment and income distribution:** The cotton industry has a lot of potential for creating employment at the different stages in the value chain. Cotton production is labour intensive as it requires a lot of weeding. Furthermore, Zambian cotton is hand-picked creating employment within the rural areas during harvest. For example, although current figures were not available, the 2004 cotton production of 172, 000 metric tonnes generated approximately US\$50 million in export earnings of cotton products. Furthermore, in addition to the 227, 000 farmers involved in cotton seed production, 1, 200 permanent employees and 1,700 temporary employees worked in the cotton industry (Global Development Solutions, 2007). Discussion with the stakeholders revealed that Dunavant alone paid ZMK220billion (US\$44 million) to farmers while the whole industry paid an estimated ZMK600 billion (US\$120 million) in 2011. Indirectly jobs are also created through agro-dealers and transporters who are involved in transportation of the inputs and crop during

the harvest season. Cooking oil is produced as a by-product and sold locally thus creating more jobs in the manufacturing and marketing sectors. However, most stakeholders believe that the sector could do much better with some more value addition. They believe the current trend of exporting raw cotton has limited the sector's contribution to employment as spinning, which is the most value adding stage, is not done in-country.

ACI and Agridev Consult (2008) have done a detailed comparison of the distribution of net income across each level of the cotton value chain to enable a comparison of benefits accruing to actors at various levels of the chain. This provides a picture of the distribution of benefits at each level of the value chain as it reflects the often vastly different volumes handled by players at each level of the chain. They calculate the value accruing to each of the levels along the value chain and apportion costs accruing to hired labor and to actor profit margins. The results are reproduced in the Table 1.

Comparison of the returns to wage employment and owner profit at each level of the chain (Table 1) shows that the cotton industry provides a greater share of own-farm profit (US\$15, 909, 950) than wage labor (US\$7, 336, 000) at the farm-level of the chain, but significantly more returns to wage labor (US\$9, 573, 480) than profit (US\$990, 360) at the processor level of the chain; indicating that the cotton industry is not only a significant provider of income to farmers, but also wage employees (ACI and Agridev Consult, 2008). For comparison purposes, Table 2 (reproduced from the data by ACI and Agridev Consult (2008)) presents a comparison of wage costs and profit margins accruing to the cotton, tobacco and smallholder sugar value chain players. This shows that the cotton industry made a bigger contribution to the Zambian economy than did the Burley tobacco and the smallholder sugarcane value chains in this particular year. This is the case because the cotton industry provided employment to over 280, 000 smallholders compared with only 9, 000 Burley producers and 161 sugarcane farmers.

**Opportunities for growth in the Zambian cotton industry:** The following analysis highlights the major opportunities for the growth of the cotton industry:

**Competitiveness of Zambian Cotton in the export markets:** Zambian farmers generally grow a medium-staple variety that is suitable for making good cotton fabrics and for blending with longer staples in fine fibres. For this reason, demand for Zambian cotton is quite high on the international markets (Tschirley and Kabwe, 2010; ACI and Agridev Consult, 2008). This is because over the past three years, a lot of effort has been concentrated at training the farmers in good management practices like pest control, proper weeding

Table 1: Employment and income distribution for the cotton value chain

Wage costs	\$/kg	kg/actor	No. Actors	Total
<b>Farmer</b>				
Wage costs	0.04	655	280, 000	\$7, 336, 000
Profit	0.08675	655	280, 000	\$15, 909, 950
<b>Processor</b>				
Wage costs	0.0522	30, 566, 667	6	\$9, 573, 480
Profit	0.0054	30, 566, 667	6	\$990, 360
Total profit				\$16, 900, 310
Total wages				\$16, 909, 480

Average yields are derived from total ginnery throughput for 2005/06 season divided by the number of out growers; this results in slightly higher than the purported average yields of 600 kg/ha since most farmers have slightly more than 1 ha; farmer wage cost assumed to be cost of hired labor for harvesting; farmer profit assumed to include returns to own labor; processor wages include wage costs as well as administration staff; Processor is assumed to follow the Distributor value chain model; ACI and Agridev Consult (2008)

Table 2: Income distribution along the cotton, tobacco and sugarcane value chains

		Cotton (US\$)	Tobacco (US\$)	Smallholder Sugar (US\$)
Producer level	Profit	15, 909, 950	2, 002, 745	2,027, 154
	Hired wage	7, 336, 000	112, 753	149, 632
Processor level	Profit	990, 360	376, 000	589, 599
	Hired wage	9, 573, 480	1, 868, 249	1, 422, 711
Industry level	Profit	16, 900, 310	2, 378, 945	2, 616, 752
	Hired wage	16, 909, 480	1, 981, 001	1, 572, 343

ACI and Agridev Consult (2008)

Table 3: Benchmarking smallholders' seed cotton production in selected countries

Country	Yield rate kg/ha	Production cost	
		\$/ha	\$/kg
Zambia	750	210.81	0.21
Pakistan	1, 680	387.34	0.23
Kyrgyzstan	2, 450	393.66	0.17
Cambodia	1, 200	415.93	0.35
Kenya	575	145.88	0.26
Mozambique	297	41.15	0.14
South Africa	473	718.77	1.52
Ethiopia	556	293.39	0.24

Global Development Solutions (2007)

and timely harvesting. This, coupled with the fact that the cotton is handpicked, makes it attract premiums on the world markets. Other factors leading to high competitiveness include investment in state of the art cotton cleaning machinery which results in good cotton staple and thus price premiums.

According to Global Development Solutions (2007), taking into account the higher yield rates and prorating the average yield to 750 kg/ha, as shown in Table 3 which benchmarks seed cotton production yield for selected countries, Zambia ranks relatively low, particularly, among smallholder farmers. However, as far as production cost is concerned (\$/kg), Zambian smallholder farmers are well within competitive range of other seed cotton producers in the region and elsewhere.

ACI and Agridev Consult (2008) did a comprehensive analysis of the competitiveness of

Zambian Cotton using value chain analysis under various smallholder management models namely:

- **Low yielding family farms:** This model does not use fertilizer, uses a standard chemical pack and unimproved crop management. The average yield for this model is 600 kg/ha
- **High yielding family farms:** This model uses 2 bags of fertilizer, standard chemical pack and unimproved crop management practices. The average yield for this model is 900 kg/ha
- **Dunavant Yield programme:** This model does not use fertilizer, uses a standard chemical pack and improved crop management practices such as timely planting, good thinning and weed control and timely spraying of agrochemicals based on good pest scouting and so on. The average yield for this model is 1200 kg/ha

Their analysis shows that the low yielding model obtains net profits of US\$94 per metric tonne, while the high yield model obtained a net profit of US\$42 and the Dunavant yield model obtains a net profit of US\$136.38 per metric tonne. The high yield model had lower net profits due to the inclusion of the cost of fertilizer. This confirms the assertion by cotton companies who refuse to provide fertilizer to smallholder farmers. This is because whereas farmers would have to double yields (from 600 kg/ha to 1200 kg/ha) before fertilizer costs starts to pay off, they could still achieve this yield through improvement of management practices. Fertilizer is not a limitation to achieving yields as high as 1200 kg/ha.

#### **Support programmes for cotton production:**

Although the cotton industry supports an estimated 21% of the population, it has not received much support from the government. For instance, the 2012 agricultural budget shows that whereas the total agricultural budget was ZMK 1, 698 billion, about 47.1% will be used to support one commodity, maize, through the Farmer Input Support Programme (FISP) for maize inputs; and the Food Reserve Agency (FRA) for maize marketing support. The rest of the budget is supposed to cater for the remaining functions such as remuneration, administration, research, infrastructure development and others (Government of the Republic of Zambia, 2011). Commodities like cotton receive very little budgetary support from the Government. Majority of the support for the cotton industry comes from the ginning companies and cooperating partners. The following list shows the interventions that are being undertaken in the sector by the private sector, cooperating partners and the government to support cotton production:

**Out grower schemes:** Under this programme, smallholder farmers producing cotton are linked to the cotton value chain under outgrower arrangements. The

basic principle of the outgrower schemes is that the private sector companies provide inputs and support to the smallholder farmers in exchange for their output, i.e., the seed cotton produced. Various models are used to reach out to as many farmers as possible over a wider geographical coverage area. One of them is the distributor model, pioneered by Dunavant which is based on the appointment of village based agents working on commission who are responsible for mobilizing; recruiting and contracting the farmers; distribution of inputs; crop monitoring; recovery of credit and ensuring that all the cotton produced by the farmers under their responsibility is delivered to the company

**YIELD programme:** Dunavant has also embarked on a yield programme. The programme was prompted by diminishing returns for the cotton growers as a result of lower prices for cotton on the international markets, exacerbated by the appreciation of the Zambian *Kwacha* in the 2005/2006 season, threatening the very survival of the cotton industry in Zambia as there was a risk that more and more smallholder farmers were opting out of cotton production in favor of other crops like maize (Dunavant, 2005). The programme aims at increasing average yields per hectare, which had stagnated at approximately 600 kg/ha under the distributor programme when the Distributors were also responsible for providing technical support to the contracted farmers, by focusing on basic key crop husbandry practices in an effort to improve average yields. Company staff provide training to incentivized Lead Farmers who each pass on the gained knowledge to groups consisting of 15 collaborating farmers.

In the absence of a policy regulating the operations of players in the cotton industry, there have been efforts by the players themselves to put up programmes and activities that regulate the operations of the industry and ensure continuity as well as increased production. These efforts are basically motivated by negative experiences such as the overcapacity in the ginning industry and the entrance of new competitors leading to companies competing for a limited amount of cotton resulting in large scale side-buying and side-selling, a phenomenon that could potentially destroy the industry. Side-selling or side-buying is where a farmer is supplied inputs and equipment on credit by one company but is approached or approaches another company, who does not run a credit and extension system, to procure the cotton produced. Thus no deductions for the credit recovery are made, leaving the original supplier with a heavy debt and no cotton to process. As Tschirley and Kabwe (2007) point out, competition can be good for farmers, resulting in more choice and better prices. But the sustainable expansion of cotton production in Zambia depends on the reliable provision of inputs on credit and good extension advice to hundreds of thousands of smallholder farmers.



Realizing this, certain bodies that regulate the behavior of players have been formed. Among these include:

**The Cotton Association of Zambia (CAZ):** This is a semi-autonomous association formed in 2005 and affiliated with the Zambia National Farmers Union (ZNFU) to represent farmer interests in the sector and providing the Zambia Cotton Ginners' Association with an organized body with whom to dialogue on key issues affecting smallholder farmers (ACI and Agridev Consult, 2008).

**Zambia Cotton Ginners Association (ZCGA):** All ginners in Zambia are members of the (ZCGA) which includes members from ZNFU, Ministry of Agriculture and Livestock (MAL) and Cotton Development Trust (CDT). Its main functions are to liaise between outgrower scheme arrangements to ensure side-selling is minimized; to develop strategies to expand cotton production and yields; and to assess market price trends and liaise on prices.

**The Zambia Cotton Outgrower Pre-financiers Association (ZACOPA):** This association was formed to safeguard the interests of the established ginners who pre-finance inputs in their outgrower schemes and attempt to prevent side-selling and side-buying of their crop.

**The Cotton Development Trust (CDT):** The CDT is a semi-autonomous grant dependent organization formed in 1999 by the then Ministry of Agriculture and Cooperatives (MACO) and mainly funded by the Ministry through the Soil Crop Research Branch (SCRB). The aim of the Trust is to develop agriculture in Zambia through strengthening the cotton sub-sector, with its main role being in research and development, while ensuring that pure cotton seed is available for and provided to the farmers by a cotton maintenance breeding program, which produces breeders' and pre-basic seed for multiplication by the gineries or contracted farmers (ACI and Agridev Consult, 2008).

**Donor funded programmes:** During the interviews, it was mentioned that donors have channelled funds through the government such as the support to CDT by the World Bank through funding the construction of a dam. Furthermore, donors are reportedly funding more projects through the Cotton Growers Association as well as running independent programmes aimed at improving cotton production such as the Competitive African Cotton Initiative (COMPACI) funded by the Bill and Melinda Gates Foundation (BMGF) and the German Ministry for Economic Cooperation and Development (BMZ) in partnership with the private sector (as represented by local private cotton companies). The COMPACI programme is a follow-up

of Cotton made in Africa Initiative (CmiA) which came to an end in 2008 and was aimed at promoting improvements in cotton production in Sub-Saharan Africa (SSA) in compliance with ecological, economic and social sustainability criteria (COMPACI/COMESA, 2011). This was achieved by working through local cotton companies who work with cotton producing families to introduce sustainable cotton farming methods such as selective use of pesticides and better application techniques as well as sustaining soil fertility through use of organic fertilizers. Furthermore, participating farmers were supported with training and small loans to finance production. Then the cotton produced under these conditions was sold under the label Cotton made in Africa (CmiA).

Following the success of the CmiA pilot from 2005-2008, the BMG and BMZ came up with COMPACI which is currently being implemented by the DEG and GTZ. Similarly the private sector represented by local cotton companies acts as partners and provided more than a third of the US\$48.9 million required over the four years the programme will be implemented. The goal of COMPACI is the sustainable improvement of the living conditions of 265, 000 cotton growers in six African countries (Zambia inclusive) by 2012. The project provides support to increase farmer's income from agriculture by one-third within the four years, to produce more staple foods and to improve their operating equipment. The increased income of the small farmers and their families will be achieved through increased productivity which in turn is achieved through educating them in farming methods, pre-financing of production and loans for draught animals, strengthening of cooperative structures, verification of small farmers and engaging local companies to market their cotton. COMPACI also advises African governments in developing strategies for the cotton sector within the framework of the Comprehensive African Agriculture Development Programme (CAADP). COMPACI also does the following:

- Financing of the extensive start-up of verification of approximately 150, 000 farmers according to the CmiA criteria and strengthening of the regional verification institutions
- Independent project monitoring and evaluation performed by the American Research Institute on the basis of on-going focus group interviews
- Has a specific gender component to support women in cotton producing families.

None of the stakeholders interviewed were aware of any legislation and tariffs directly impacting on their sector. Apparently ginners are able to export any

amount of lint produced without hindrance. However, it was highlighted that the issuance of investment licenses and tax incentives for those investing in rural areas is likely to benefit the cotton sector as investors are likely to setup ginning companies in the rural areas.

**Constraints to growth in the cotton industry:** The analysis highlighting the major constraints militating against the growth of the cotton industry in Zambia is presented below:

**Low productivity:** The biggest constraint identified by all the stakeholders interviewed was the low volumes produced as well as the low productivity of cotton. The Global Development Solutions (2007) study shows that increasing farmer yields would help lower the cost/kg for the ginneries (whose cost of ginning is also among the highest) since the ginneries would receive a greater return on the administrative, loan interest and input costs that they spend on their respective outgrower programs. Keyser (2007) shows that despite good progress with development of outgrower schemes and smallholder supply networks, cotton yields in Zambia remain extremely low compared to world and even African standards. While there has been some improvements in yields since the introduction of outgrower schemes (from around 500-600 kg/ha in the mid-1990s to the current 700-800 kg/ha for smallholder farms), these yields are very low compared with Cameroon, Mali and other West African countries where smallholders often achieve yields of 1,200 kg/ha or more. Among the reasons for the low yields include late planting by farmers who prefer to plant maize first; poor weed control and chemical use. The lack of proper regulation in the industry also contributes to this low productivity. This is because so many ginning companies were established which promoted pirate buying of cotton. As a result, most companies stopped investing in the farmers in terms of providing extension and quality inputs leading to low productivity. Although prices tend to be high, farmers are not able to benefit as yield and returns to labour tend to be low.

**Low technology adoption:** Low technology adoption is perceived as a constraint to growth by Cotton Association of Zambia (CAZ). The failure by the nation to adopt genetically modified cotton is seen as a constraint as Zambia is being left out when the rest of the world is growing *Bacillus thuringiensis* cotton (BT cotton) which is perceived to have potential for improving production. Burkina Faso (the continent's largest producer of cotton) has been growing BT cotton while other countries like neighbouring Tanzania have been undertaking trials (Dalberg, 2011). BT cotton is engineered for pest resistance. It leads to a reduction in

crop damage with associated efficiencies in input costs and can increase the quality of cotton by avoiding spotting and discoloration associated with pests. Furthermore, in countries with low yields due to low application of pesticides by credit-constrained farmers, adoption of BT cotton can lead to increases in yields. However, in Zambia, while the policy-makers realize the importance of the advantages associated with BT cotton, they also claim to be aware of the risk that such modified genes would enter the food value chain via cotton cake, a common feed for beef cattle in commercial feedlots. Research has not yet been conducted on how such modified genes could affect the meat in beef cattle and the people consuming the meat. Moreover, others claim that the introduction and cost savings of genetically modified cotton seed may be less than the benefit of developing an "organic" brand for Zambian cotton seed, lint cotton, yarn and woven fabric (Global Development Solutions, 2007). Furthermore, some stakeholders interviewed pointed out that recent studies show that BT cotton does not perform very well under small-scale management and that the costs and risks involved with it do not warrant the increase in the yields that are obtained. However, all agreed that there is need to still explore whether BT cotton should be introduced slowly among the progressive farmers.

**High input and transaction costs:** Input costs were not seen as a major constraint as most cotton production is pre-financed. However, the range of inputs provided was perceived as having the potential to limit productivity. The input range offered by outgrower companies does not include fertilizer and consequently smallholder farmers do not use fertilizers. However, Keyser (2007) shows that even though cotton yields could improve substantially with only 2-3 bags of Compound C per hectare, cotton produced using fertilizer costs 60% more per metric tonne making smallholder farmers that produce cotton without fertilizer being the lowest cost producers despite getting low yields. Another study (Global Development Solutions, 2007) which attributes much of the low cotton yields in Zambia to extensive soil depletion claims that the soils are so depleted that fertilizer application would only provide minimal benefit. Consequently farmers find it profitable to divert fertilizers, when it is provided, to crops like maize which are highly responsive to fertilizer application.

Logistic costs including transport and access to information were identified as another constraint. Due to limitations in information flow between the market players, the vice of side-selling has persisted occurring more often when production is reduced or when demand increases greatly. Side-selling always reduces recovery rates for those who pre-finance cotton and reduces the incentive for them to expand into certain areas. Poor road infrastructure received mention from

some stakeholders who highlighted that in certain outlying areas, the soils are very good for cotton production with the constraint of inaccessibility.

**Lack of clear regulatory control and coordination:**

Whereas market access was not perceived as a constraint by most stakeholders, policy was generally cited as a constraint by all stakeholders who were interviewed. The Zambian cotton industry is still dominated by two companies, but the new entrants as a group appear to be large enough and well established to change the competitive dynamics in the sector. However, while competition could be good for the farmers' expansion of cotton production, the sustainability of this growth depends on continued improvement in service provision. Experiences from past years in Zambia and neighbouring countries show that uncontrolled competition among companies can lead to widespread credit default which undermines input credit provision, extension and cotton quality (Tschirley *et al.*, 2009; Tschirley and Kabwe, 2010). This is the reason why key stakeholders have been calling for the need to develop a regulatory structure that preserves the positive performance associated with concentrated sectors while providing enough room for competition from new firms to ensure continued innovation and remunerative prices for farmers which is still absent.

According to Tschirley and Kabwe (2010), Zambia does not have any formal set of publically known rules with some level of public sector participation. This is despite efforts of various stakeholders in the cotton sector who have worked to formalize a regulatory structure in the form of a Cotton Act (though the Cotton Board proposed within the Act has been formalized and has been operational since 2009). The Act has a lot of provisions that are likely to regulate the operations of the players in the cotton industry. The failure to enact the Cotton Act has largely been attributed to changes in the Ministers of Agriculture during critical periods (as each new Minister has requested to be familiarized with the Act before they can proceed with it). Consequently private companies run their businesses and coordinate with each other in largely informal ways, with little if any influence from government and no formal rules governing what influence could bring to bear. For instance, the industry currently relies on self-regulation and there are instances when issues like side-selling undermine the players' ability to invest in the industry as they are not guaranteed returns on their investments. Ultimately, the industry has not received as much investment in extension and input provision as it potentially could, leading to continued low productivity. Such issues could be addressed by the Act as it empowers the Cotton Board to register all operators in the sector and issue licenses and certificates without which they cannot operate. The

Board also has the mandate to withdraw these licenses when an operator is engaged in vices such as side buying.

Some concerns about the Cotton Act were raised as early as 2005 by some key stakeholders in the Cotton sector. The Republican President directed Ministry of Agriculture and Cooperatives (MACO) to accommodate the raised concerns. The MACO created a committee (Cotton Working Group (CWG)) in 2006 comprising MACO, ZCGA, CAZ, CDT and Food Security Research Project (FSRP) to review the Act. The Cotton Working Group (CWG) has reviewed the Cotton Act of 2005 but it has not been presented to Parliament for enactment. The draft revised Act has addressed most of the concerns raised by stakeholders. However, in the 2005 Cotton Act and even in the revision, the pricing mechanism is silent. That is, there is no mention of how the price would be set or how the stakeholders would come up with the selling price of seed cotton. The lack of a provision for a clear and transparent price setting mechanism under the Cotton Act has led to farmers developing mistrust against the ginning companies who they feel are cheating them on the selling price. This has led to heated standoffs over price between farmers and the Zambia Cotton Ginners Association (ZCGA).

Serious problems were experienced in the 2011/12 marketing season during which some smallholder outgrower farmers felt that the price that was offered by ginners was low. Some of the farmers burnt the cotton crop rather than sell it to the ginners at the low price which was being offered (Chanda, 2012; Cotton Association of Zambia and the Zambia National Farmers Union, 2012). This is a clear indication to the stakeholders that in a concentrated sector where we have few large agri-business firms dealing with a very large number of small-scale farmers, there is great potential for conflict. The stakeholders involved (Cotton Association of Zambia and Zambia Cotton Ginners Association) have to be open to their members and inform them on what is prevailing in the international market with regard to the price and what the impact that would be on the local prices. It seems each association tends to protect its own interest. The current situation where we have CAZ and ZCGA meet and are having different viewpoints on price determination because of information asymmetry is a source of conflict. There is need to find an appropriate and transparent mechanism to monitor the international market for cotton and advise all the stakeholders on the minimum and possible maximum price range of seed cotton. That will assist to bring back the lost trust among the stakeholders in the cotton sector.

As regards phyto-sanitary regulations, the lack of regulation of cotton seed for planting has also been a major constraint. Professional seed companies are at present not involved in seed cotton production, like they do for other crops such as maize, soya beans etc.

The different outgrowers are responsible for producing their own seed. However, some of them have in at times supplied seed which is of questionable quality to their farmers leading to low productivity. This seed challenge is being exacerbated by the set-backs facing the Cotton Development Trust (CDT) which is responsible for developing foundation seed which is then given to the ginners to multiply over time. The Global Development Solutions (2007) reported that the CDT which is supposed to conduct research and test cultivars does not receive much support from the cotton industry, while the support from the government has not been sufficient. Consequently, they are constrained in the manner in which they serve both the cotton producers and the Zambian cotton industry. It was reported that the last introduction of new cotton cultivars into the Zambia cotton production sector occurred in 1995. Similarly, although the growing of ratoon cotton is discouraged because it causes disease build-up, some outgrower companies have tolerated this activity which has the potential to bring about disease and negatively affect production if left unchecked.

### CONCLUSION

The cotton sector has considerable potential to contribute to growth and employment in Zambia as it already accounts for direct and indirect employment of approximately 21% of the population and about 19% of the total agricultural GDP. The prominence of smallholder farmers in the sector is indicative of the income equity promotion potential of the cotton sector. However, the highly concentrated structure of the cotton sector (with two key players currently accounting for about 80% of the total market share in ginning); the absence of regulatory mechanisms around the setting of prices; the openness of the local market to global price fluctuations and market distortions and the lack of support programmes (compared to competing crops such as maize) are the major impediments to equity promotion in the sector.

Overall growth of the cotton sector is constrained by low productivity (cotton productivity in Zambia is relatively low in comparison to other competing producers in the region) arising mostly from poor farming practices such as late planting, weeding, spraying and harvesting. The low productivity has had negative ripple-effects on the entire value chain, as ginners have had to operate below full capacity due to low supply of seed cotton, thus raising the unit ginning costs and consequently reducing the competitive advantage of Zambian cotton. Furthermore, increased production in major world markets due to subsidies and the use of bio-technology in cotton production have undermined the competitive edge of Zambia's cotton in the international markets. For Zambia to realize the potential of the cotton sector, interventions need to be targeted at the following:

- Developing programmes that raise productivity at farm level
- Facilitating consensus between cotton buyers and farmers on the price setting mechanisms
- Developing innovative pooled insurance products that can facilitate managing risks for the small-scale farmers
- Facilitating informed policy development through promoting policy debate and evidence gathering on critical government policies such as reviewing the consequences of the maize subsidy and analysing the costs and benefits of the adoption of biotechnology.

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