

## ZAMBIA

### Potentials and Possibilities for German Collaboration in Agriculture



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This report is work in progress and continuously being updated. Any feedback and suggestions for further improvement are welcome and can be sent to [pari@uni-bonn.de](mailto:pari@uni-bonn.de).

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## **1 General background information of the agricultural and food sectors**

The agricultural sector plays an important role in the Zambian economy. It generates between 16 and 20% of the Gross Domestic Product (GDP) and more than 70% of the country's population depends on agriculture for livelihood, especially in rural areas. The sector also accounts for about 67% of the labor force and remains the main source of income and employment for rural women and men (GRZ-FAO, 2009). The current Zambian Government (and even past Governments) has identified agriculture as the number one key driver sector of the economy, complementing the mining sector which has been the largest contributor of foreign exchange earnings and national revenue.

The aspirations of the Zambian people – as captured in the Vision 2030 formulated in December 2006 – is “among other things, a diversified and balanced and strong industrial sector, a modern agricultural sector and an efficient and productive services sector”. And according to the current plan, the Sixth National Development Plan: 2011-2015 (SNDP: 2011-2015) the country plans to diversify and grow the economy, focusing on agriculture, tourism, manufacturing, mining and energy, as the growth sectors/areas (SNDP: 2011-2015).

This is in cognizance of the country's vast resource endowment in terms of land, water, labor and climate. This vast natural resource endowment reflects the enormous potential to expand and/or excel in agricultural development. Out of the 75 million ha total land area 42 million ha (58%) is classified as medium to high potential for agricultural production and suitable for the production of a broad range of crops, livestock and fish, with an annual rainfall ranging between 800 mm to 1500 mm. The potential of irrigable land is over 423,000 ha, of which about 100,000 ha is currently irrigated among the large-scale, emergent and smallholder farmers. With the country's abundant surface and underground water resources, there is potential to drastically increase the area under irrigation (it is said that Zambia has about 40% of the water resources in the SADC Region).

Agriculturally and based on annual rainfall pattern and/or soil variability, the country is divided into three major agro-ecological regions (Regions I, II and III).

Region I: covers parts of Southern, Eastern and Western Provinces and constitutes 12% of the country's total land area. The Region receives annual rainfall of less than 800 mm and its soil type is loamy to clayey on the valley floor and coarse to fine loamy shallow soils on the escarpment. It is suitable for the production of crops such as cotton, sesame, sorghum, groundnuts, beans, sweet potatoes, cassava, rice and millet and has potential for the production of various irrigated crops including fruits and vegetables. This Region is also suitable for extensive cattle production. However, the valley part of the Region lies on a low altitude, is consequently hot and humid, and because of tsetse flies this part is not suitable for cattle rearing.

Region II: is sub-divided into Region IIa and IIb. It constitutes 42% of the country and receives annual rainfall of between 800 mm to 1,000 mm. Region IIa covers the Central, Lusaka, parts of Southern and Eastern provinces. Generally it has inherently fertile soils and thus permanent settled systems of agriculture are practiced in this sub-Region. A variety of crops are grown including maize, cotton, tobacco, sunflower, soybeans, irrigated wheat, groundnuts and other arable crops. The area is also suitable for flowers, paprika and vegetable production. The sub-Region is also suitable for beef, dairy and poultry production. On the other hand, sub-Region IIb covers part of Western Province and consists of sandy

soils. It is suitable for the production of cashew nut, rice, cassava, millet and vegetables; and also suitable for beef, dairy and poultry production.

Region III: covers the Copperbelt, Luapula, Northern, Muchinga and North-western Provinces. It constitutes 46% of the Country's total land area and receives annual rainfall of between 1,000 mm and 1,500 mm. With the exception of the Copperbelt Province, the Region is characterized by highly leached, acidic soils and thus the Region's agricultural potential can be enhanced by application of agricultural lime and organic matter. However, it has the inherent potential for the production of millet, cassava, sorghum, beans, groundnuts, coffee, sugarcane, rice and pineapples. Its perennial streams can be utilized for small-scale irrigation. Increased exploitation of the fisheries resources and introduction of fish farming, offers good opportunities for development.

In nearly all the country's National Development Plans, agriculture has featured prominently. During the implementation of the National Agricultural Policy (NAP) 2004-2015, the agriculture sector registered some positive gains in a number of areas. The cited notable ones include:

- i) An increase in crop production. For instance for selected crops, harvests from 2004 to 2013 increased as follows:
  - Maize: from 1,213,202 metric tons (MT) to 2,532,800 MT (by an average of 12.8 %);
  - Rice: from 11,699 MT to 44,747 MT (by an average of 18.3 %);
  - Wheat: from 82,585 MT to 273,584 MT (by an average of 18.8 %);
  - Cassava: from 911,673 MT to 1,114,583 MT (by an average of 6.4 %);
  - Groundnuts: from 69,696 MT to 106,792 MT (by an average of 13.9 %);
  - Mixed Beans: from 18,161 MT to 56,411 MT (by an average of 16.8 %);
  - Soybeans: from 54,687 MT to 261,063 MT (by an average of 26.3 %); and
  - Sunflower: from 13,857 MT to 33,733 MT (by an average of 29.6 %).
- ii) An increase in capture fisheries and aquaculture fish production. Total annual capture fish production increased from 67,725 MT in 2004 to 76,214 MT in 2012 (by 12.5 %). Total inland aquaculture fish production on the other hand also increased from 5,125 MT in 2004 to 12,988 MT in 2012 (by 153 %).

A general increase in the pig population from 286,726 in 2004 to 704,832 in 2008. However, goats decreased from 1,002,376 in 2004 to 746,143 in 2008 and the cattle population decreased from 2,341,970 in 2004 to 2,315,327 in 2008;

- iii) Additionally, among small scale farmers the average maize yields increased from 1.93 MT/ha in 2004 to 2.24 MT/ha in 2012, thereby marginally contributing to increases in maize production besides increases attributed to increased area under maize. However, it should be noted that these average yields fluctuated downwards from 1.93 MT/ha in 2004 to 1.31 MT/ha in 2008 before reaching a maximum of 2.25 MT/ha in 2010 and again decreasing to 1.93 MT/ha in 2013, thereby indicating that no meaningful progress has been recorded in achieving increased productivity in maize production despite huge investments made in providing input subsidies. Low productivity has been attributed to unfavorable rainfall performance, weak extension services and poor research and technology transfer.

According to the Central Statistical Office's (CSO) Living Conditions Monitoring Surveys of 2006 and 2010, agriculture has marginally led to an increase in rural incomes and

contributed marginally to poverty reduction and increased food and nutrition security (Mason *et al.*, 2013).

Also the increases in agriculture production and/or gains recorded during the implementation of the NAP: 2004-2015 have not been significant enough to meet the growing domestic and foreign demand for Zambian agricultural commodities. This is also despite the skewed increased Government budgetary allocations (more than 60%) of the expenditure channeled towards maize production and marketing.

### **1.1 Pan-African policies and strategies**

Zambia is part or aligned to a number of strategies and frameworks existing at continental, regional and/or sub-regional levels for agricultural and rural development. These include those developed by the African Union (AU), the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA). A few examples include:

- The Comprehensive Africa Agriculture Development Programme (CAADP) of 2003 which has been prepared through the facilitation of the Food and Agriculture Organization of the United Nations (FAO) in close collaboration with the NEPAD Secretariat and being implemented by NEPAD. It is for African integration through agriculture. The CAADP has been prepared to promote interventions that best respond to the widely recognized crisis situation of African agriculture. In its commitment to CAADP, Zambia has also developed and signed the CAADP Compact on 18th January 2011 to support the implementation of the Vision 2030 and NAP. Under CAADP, African countries' governments agreed to commit at least 10% of their national budget to agriculture with the projection that it will lead to 6% annual growth rate for the sector. Going further under CAADP, Zambia has developed the National Agriculture Investment Plan (NAIP) 2014-2018, designed to make a difference in the manner in which the agricultural development agenda will be pursued in the country. The emphasis of NAIP is pro-poor agricultural-led economic development;
- The African Peer Review Mechanism (APRM) in 2004, implemented one year after endorsement of the CAADP;
- The Abuja Declaration on Fertilizer for an African Green Revolution, under which the AU Member States resolved to increase fertilizer use from 8.0 Kg to 50.0 Kg of nutrients per hectare by 2015;
- The Malabo Declaration of June 2014, intended to accelerate agricultural growth and transformation for shared prosperity and improved livelihoods by "Harnessing Opportunities for Inclusive Growth and Sustainable Development";
- The Science Agenda for Agriculture in Africa (S3A) 2014, which was developed by a coalition of actors under the leadership of the Forum for Agricultural Research in Africa (FARA). The S3A is an African-owned and -led process that articulates the science, technology, extension, innovations, policy and social learning that Africa needs to apply in order to meet its agricultural and overall development goals. The Science Agenda, in the medium- to long-term, aims at building systemic science capacity at national and regional levels, capable of resolving evolving needs for farmers, producers, entrepreneurs and consumers, e.g. effects of climate change;

- Southern Africa Development Community-Regional Agricultural Policy (SADC-RAP): Zambia has been active in the SADC's idea of coming up with a Regional Agricultural Policy (RAP) aimed at harmonizing the growth and development of agriculture and promotion marketing and trade among SADC member States.

## **1.2 National (and regional) policies and strategies**

There are currently a number of national policy and strategy documents guiding the development of the Agricultural Sector in Zambia. Notable ones include:

- *National Agricultural Policy (NAP): 2004-2015*: currently been revised or updated. It is built on the following six guiding principles:
  1. The right to adequate and nutritious food;
  2. Equitable, inclusive and sustainable development;
  3. Profitability and competitiveness;
  4. Cognizance of current traditional and state land tenure systems;
  5. Stakeholder involvement; and
  6. Cognizance of international Treaties, Protocols and Agreements.
- *Vision 2030*: Long-term development document that includes all other national socio-economic sectors besides agriculture.
- *Sixth National Development Plan (SNDP): 2011-2015*: a national medium-term development plan which also includes all other national socio-economic sectors besides agriculture.
- *National Agriculture Investment Plan (NAIP) 2014-2018*: formulated or developed under CAADP, *outlining* key interlinked and complementary areas of support for investment. The overall objective of NAIP is "to facilitate and support the development of a sustainable, dynamic, diversified and a competitive agricultural sector that assures food security at household and national levels and maximizes the sector's contribution to GDP". In order to realize the objective, the following four inter-related programmes are planned and two categories of key support services (KSS) to be implemented under the NAIP:  
Programmes: (a) Sustainable Natural Resources Management; (b) Agricultural Production and Productivity Improvement; (c) Market Access and Services Development; and; (d) Food and Nutrition Security and Disaster Risk Management.  
KSS: (a) Knowledge Support Systems; and (b) Institutional Strengthening.

Other sub-sector policies and strategies include: (i) National Aquaculture Strategy for Zambia, (ii) National Aquaculture Development Plan, (iii) National Rice Development Strategy (NRDS), (iv) Cassava National Development Strategy, (v) National Irrigation Policy and (vi) Cooperatives Development Policy (draft).

It is important to underline that contemporary agrarian forms, processes and dynamics are shaped by the past political, economic, cultural and institutional arrangements. The historical context of the national and sub-regional policies and strategies for the development of agriculture in Zambia can be summarized in four broad but overlapping phases: (i) the Colonial period; (ii) Early Independence; (iii) 1980 to 2000; and (iv) 2000 and beyond or to-date. A detailed overview of the development of the agricultural sector on Zambia is provided in Appendix II.



### **Other On-going Agricultural Programmes and Projects**

The following are some of the currently running and/or about to commence agricultural projects in Zambia:

- Agricultural Productivity Programme in Southern Africa (APPSA) - World Bank-funded;
- Enhanced Smallholder Livestock Investment Project (E-SLIP) - IFAD funded;
- Irrigation Development Support Project (IDSP) - World Bank funded;
- Smallholder Agribusiness Promotion Programme (SAPP) - IFAD funded;
- Livestock Development and Animal Health Project (LDAHP) - World Bank funded;
- Livestock Infrastructure Support Project (LISP) - AfDB funded;
- Support to Productivity and Production Project (S3P) - IFAD funded;
- Pilot Project on Climate Resilience (PPCR) - World Bank funded;
- Farmer Input Support Programme (FISP) - Government of the Republic of Zambia (GRZ) funded;
- Support to the Agricultural Sector Performance Enhancement Programme (PEP) - EU funded;
- CASU (EU through FAO);
- Agricultural Productivity and Market Enhancement Project (APMEP) - AfDB funded;
- Strengthening Rice Seed Production and Enhancing Extension Services to increase Rice Production in Zambia (FAO);
- Developing Value Chain Innovations and Value Chains to Improve Food Security in East & Southern Africa - Australian-agency funded;
- Food Security Pack (FSP) - GRZ funded;
- Programme for Accompanying Research innovations (PARI).

### **1.3 Data on food and nutrition security**

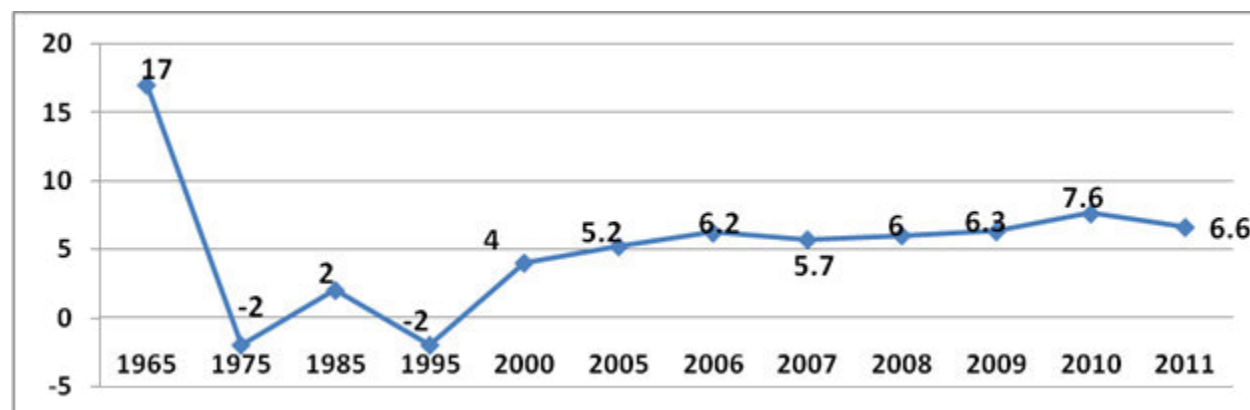
The following section includes information about important socio-economic indicators, production and trade data and data on consumption and nutrition status.

**Table 1: Selected national economic and health-related data**

| Indicator   | Data           | Year |
|---|----------------|------|
| Population, total   | 1,5021,002     | 2014 |
| Population growth (annual %)  | 2.5            | 2014 |
| Rural population (% of total population)  | 60             | 2014 |
| GDP per capita, PPP (constant 2011 international \$)                            | 3898           | 2014 |
| GNI per capita, PPP (constant 2011 international \$)                            | 52,914,077,683 | 2013 |
| Poverty headcount ratio at \$2 a day (PPP) (% of population)                    | 87             | 2010 |
| Poverty headcount ratio at \$1.25 a day (PPP) (% of population)                 | 74             | 2010 |
| Poverty headcount ratio at national poverty lines (% of population)             | 61             | 2010 |
| Rural poverty headcount ratio at national poverty lines (% of rural population) | 78             | 2010 |
| Agricultural land (% of land area)  | 32             | 2012 |
| Agricultural irrigated land (% of total agricultural land)                      | no data        |      |
| Agriculture value added per worker (constant 2005 US\$)                         | 353            | 2014 |
| Agriculture, value added (% of GDP)   | 10             | 2013 |
| Access to electricity, rural (% of rural population)                            | 5.8            | 2012 |
| Employees, agriculture, female (% of female employment)                         | 79             | 2005 |
| Employees, agriculture, male (% of male employment)                             | 66             | 2005 |
| Employment in agriculture (% of total employment)                               | 72             | 2005 |
| Literacy rate, adult total (% of people ages 15 and above)                      | 61             | 2007 |
| Ratio of female to male secondary enrollment (%)                                | 59             | 1988 |
| Mortality rate, under-5 (per 1,000 live births)                                 | 87             | 2013 |
| Malnutrition prevalence, weight for age (% of children under 5)                 | 15             | 2007 |
| Malnutrition prevalence, height for age (% of children under 5)                 | 46             | 2007 |
| Maternal mortality ratio (modeled estimate, per 100,000 live births)            | 280            | 2013 |

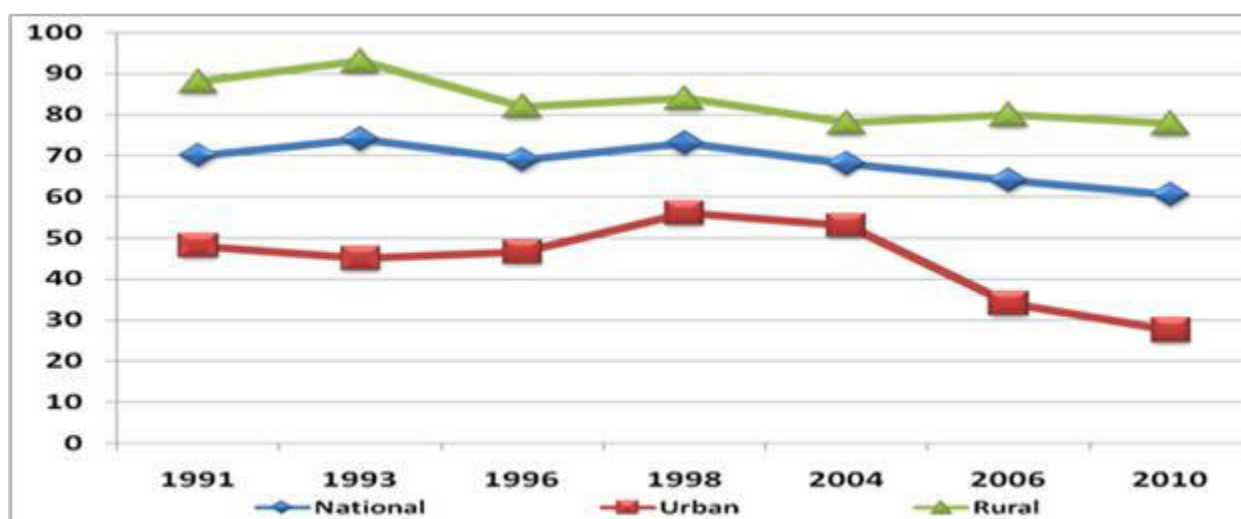
Source: World Bank, <http://data.worldbank.org/country>

**Figure 1: Annual GDP Growth (%) 1965 to 2011**



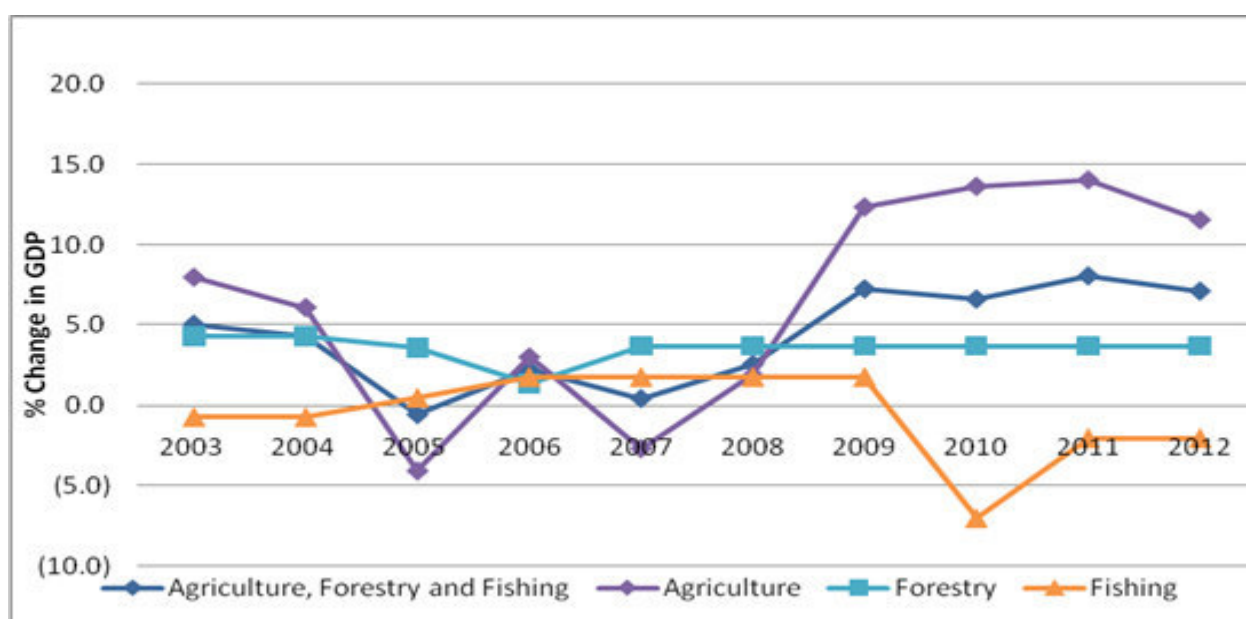
Source: Central Statistics Office (CSO)

Figure 2: Percentage Trends in Incidences of Poverty Levels (1991 - 2010)



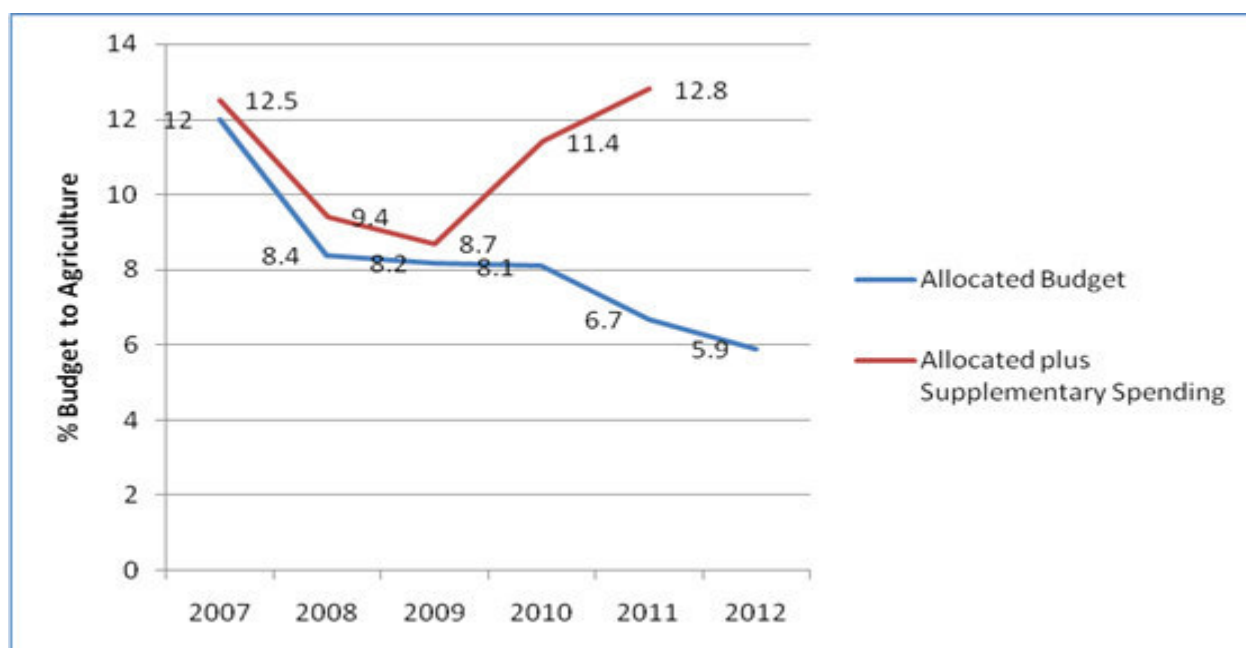
Source: CSO-Living Conditions Monitoring Surveys

Figure 3: Agricultural Sector Growth Rate (% change in constant 1994 Zambian Kwacha terms)



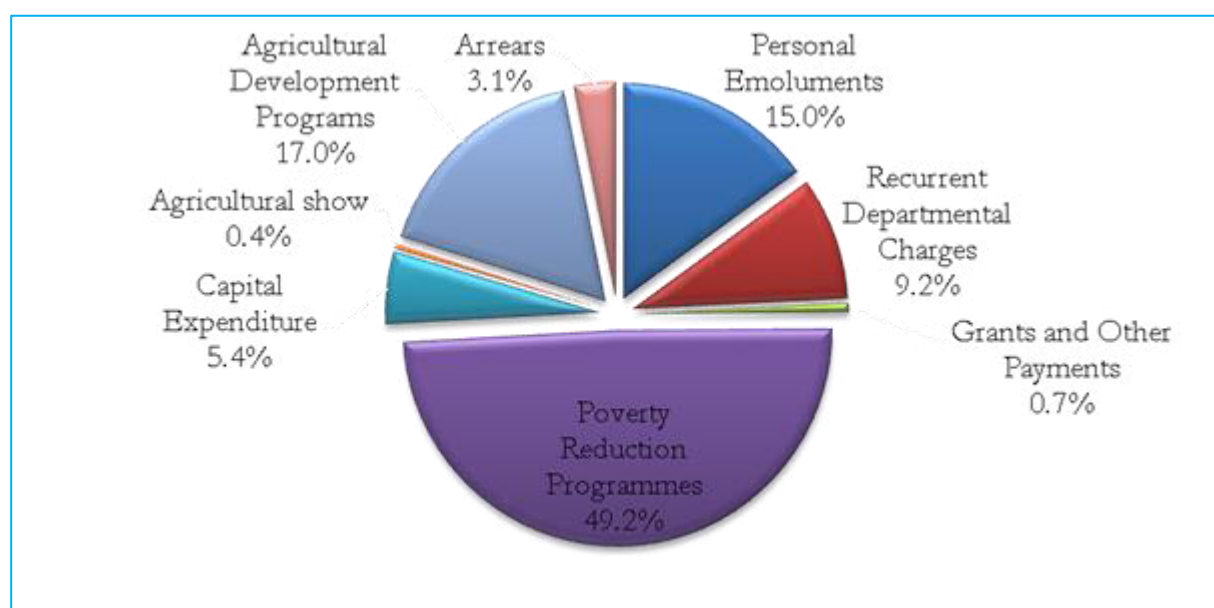
Source: CSO

**Figure 4: Percentage of National Budget Spent on Agriculture 2007-2012: Allocated and Actual Spending**



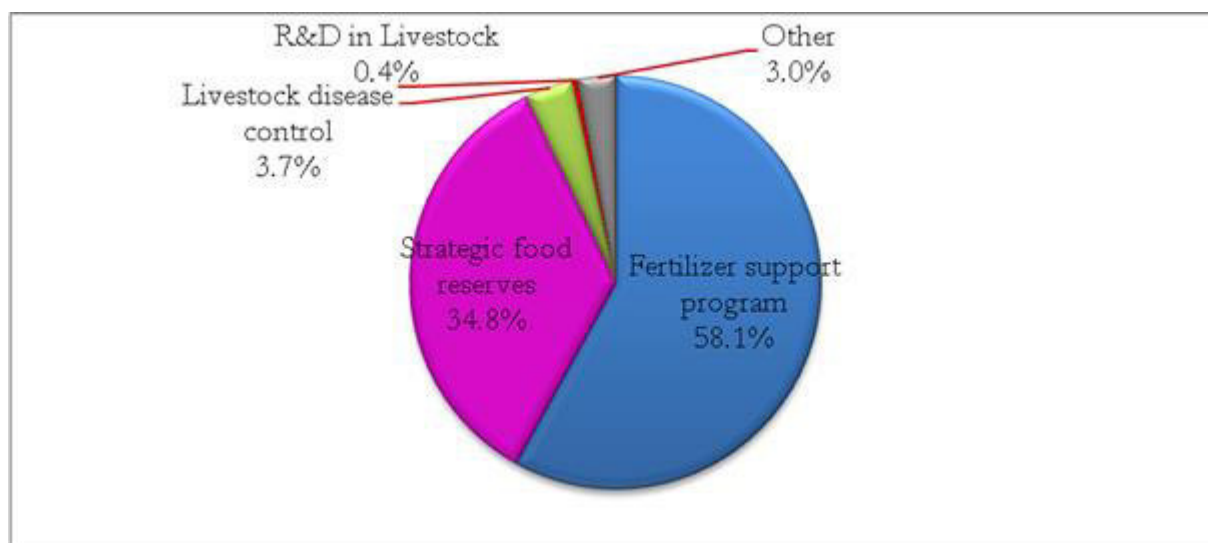
Source: Kuteya 2012

**Figure 5: 2013 Budget Allocations to Agriculture**



Source: Kuteya, 2012

Figure 6: Distribution of Poverty Reduction Programme Spending 2013



Source: Kuteya 2012

## 1.4 Data on most relevant crops and value chains

### 1.4.1 Production

Maize and cassava are important crops in Zambia. Cotton is also widely produced while soybeans rank relatively highly in terms of both volume and value of production.

Table 2: Top 10 crops produced by area, volume and value

| Area harvested (ha)     |                | Production volume (tons) |                | Production value* |                |
|-------------------------|----------------|--------------------------|----------------|-------------------|----------------|
| Top 10                  | Share of Total | Top 10                   | Share of Total | Top 10            | Share of Total |
| Maize                   | 47.5           | Sugar cane               | 39.6           | Maize             | 66.7           |
| Cassava                 | 9.3            | Maize                    | 29.2           | Cassava           | 20.9           |
| Seed cotton             | 9.1            | Cassava                  | 11.2           | Soybeans          | 7.1            |
| Groundnuts, with shell  | 8.9            | Vegetables, fresh nes    | 3.6            | Pulses, nes       | 2.8            |
| Soybeans                | 4.0            | Wheat                    | 2.7            | Millet            | 1.6            |
| Pulses, nes             | 2.8            | Soybeans                 | 2.0            | Sorghum           | 0.9            |
| Tobacco, unmanufactured | 2.7            | Seed cotton              | 1.9            |                   |                |
| Vegetables, fresh nes   | 2.1            | Groundnuts, with shell   | 1.7            |                   |                |
| Sunflower seed          | 2.1            | Sweet potatoes           | 1.7            |                   |                |
| Sweet potatoes          | 2.0            | Cottonseed               | 1.2            |                   |                |

groundnuts: no data

\* Gross Production Value (constant 2004-2006 million US\$)

Note: AIC value chains are marked in red; nes refers to Not elsewhere specified

Data: average 2011-2013, FAOStat, accessed 9 July 2014

### 1.4.2 Consumption and nutrition status

Maize and cassava are also the most widely consumed crops in Zambia closely followed by roots and tuber (Table 3).

**Table 3: Food supply by tons, kg per capita and kcal per capita**

| Food supply quantity (tons) |            | Food supply quantity (kg/capita/yr) |     | Food supply (kcal/capita/day) |      |
|-----------------------------|------------|-------------------------------------|-----|-------------------------------|------|
| Top 10                      | % of total | Top 10                              | kg  | Top 10                        | kcal |
| Maize and products          | 31         | Maize and products                  | 117 | Maize and products            | 983  |
| Cassava and products        | 19         | Cassava and products                | 72  | Roots & Tuber Dry Equiv       | 251  |
| Roots & Tuber Dry Equiv     | 7          | Roots & Tuber Dry Equiv             | 25  | Cassava and products          | 218  |
| Vegetables, Other           | 6          | Vegetables, Other                   | 22  | Sugar, Raw Equivalent         | 101  |
| Beverages, Fermented        | 5          | Beverages, Fermented                | 20  | Sugar (Raw Equivalent)        | 97   |
| Wheat and products          | 3          | Wheat and products                  | 12  | Sugar, Refined Equiv          | 97   |
| Sweet potatoes              | 3          | Sweet potatoes                      | 11  | Wheat and products            | 95   |
| Sugar, Raw Equivalent       | 3          | Sugar, Raw Equivalent               | 11  | Groundnuts (in Shell Eq)      | 73   |
| Sugar (Raw Equivalent)      | 3          | Sugar (Raw Equivalent)              | 10  | Groundnuts (Shelled Eq)       | 73   |
| Beer                        | 3          | Beer                                | 10  | Soybeans                      | 58   |

Data: average 2011-2013, FAOStat, accessed 22 July 2015

### 1.4.3 Trade

**Table 4: AIC value chains: Soy (together with maize/cotton), Groundnut (together with bean)**

| Import volume (tons)                  |                | Import value (US\$) |                |
|---------------------------------------|----------------|---------------------|----------------|
| Top 10                                | Share of Total | Top 10              | Share of Total |
| Oil. palm                             | 22.3           | Oil. palm           | 22.1           |
| Groundnuts, shelled                   | 9.3            | Food prep nes       | 7.1            |
| Oil, soybean                          | 5.4            | Oil, soybean        | 6.2            |
| Beer of barley                        | 5.1            | Groundnuts, shelled | 5.4            |
| Food prep nes                         | 4.8            | Beer of barley      | 3.8            |
| Rice – total (Rice milled equivalent) | 4.1            | Milk, whole dried   | 2.7            |
| Malt                                  | 4.1            | Margarine, short    | 2.4            |
| Cake, soybeans                        | 3.8            | Malt                | 2.3            |
| Oranges                               | 2.7            | Pastry              | 2.3            |
| Apples                                | 2.5            | Juice, fruit nes    | 2.3            |
| Maize                                 | 1.4            | Maize               | 0.6            |
| Soybeans                              | 0.3            | Soybeans            | 0.2            |
| Cottonseed                            | 0.3            | Cottonseed          | 0.1            |

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

AIC value chains marked in red; nes refers to Not elsewhere specified

Table 5: Export and Import of AIC value chains:

| Export volume (tons)    |                | Export value (US\$)     |                |
|-------------------------|----------------|-------------------------|----------------|
| Top 10                  | Share of Total | Top 10                  | Share of Total |
| Maize                   | 39.7           | Maize                   | 25.1           |
| Sugar Raw Centrifugal   | 21.7           | Cotton lint             | 17.3           |
| Cotton lint             | 5.1            | Sugar Raw Centrifugal   | 15.3           |
| Molasses                | 4.5            | Tobacco, unmanufactured | 14.8           |
| Flour, wheat            | 4.3            | Flour, wheat            | 3.5            |
| Bran, maize             | 3.5            | Crude materials         | 2.7            |
| Cottonseed              | 3.3            | Pastry                  | 2.1            |
| Tobacco, unmanufactured | 3.2            | Oil, olive residues     | 1.8            |
| Sugar refined           | 1.7            | Sugar confectionery     | 1.5            |
| Cake, cottonseed        | 1.2            | Cotton, carded, combed  | 1.5            |
| Cake, soybeans          | 0.9            | Cake, soybeans          | 0.5            |
| Soybeans                | 0.6            | Soybeans                | 0.3            |

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Note: AIC value chains marked in red.

Palm oil is the most important import good in Zambia and accounts for more than 22% of the import volume and value. It is followed by groundnut, which accounts for nearly 10% of the import value. Maize accounts for almost 40% of the export volume and 25% of the export value. Furthermore, sugar, cotton and tobacco are important export goods. Soy and soy products only account for less than 1% of import and export trade.

## 1.5 National (and regional) innovation system

### 1.5.1 Research system and organizations

#### 1.5.1.1 International

International support through research and project/programme implementation for agricultural growth and development in Zambia is also offered through various organizations/institutions. Notable ones include:

- The United Nations Food and Agriculture Organization (FAO);
- The United Nations Development Program (UNDP);
- International Fund for Agricultural Development (IFAD);
- World Food Programme (WFP);
- World Bank;
- Countries such as the United Kingdom (DfID) or European Union, Sweden, Norway and Finland;
- United States Agency for International Development (USAID);
- Japan International Cooperation Agency (JICA);
- Indaba Agricultural Policy Research Institute (IAPRI);
- The Consultative Group International Agricultural Research (CGIAR):
  - World Fish Centre;
  - Center for International Forestry Research (CIFOR);
  - International Food Policy Research Institute (IFPRI);
  - International Institute of Tropical Agriculture (IITA).

Other regional organizations also contributing to agricultural development in the Country include:

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- African Development Bank (AfDB);
- Forum for Agricultural Research in Africa (FARA);
- Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA);
- Coalition for African Rice Development (CARD);
- SADC - Genetic and Plant Resources Research Institute.

### **1.5.1.2 National**

Agricultural research in Zambia is largely undertaken by the Ministry of Agriculture and Livestock through the Zambia Agriculture Research Institute (ZARI), the Golden Valley Agricultural Research Trust (GART), and CVRI. The University of Zambia (UNZA), National Institute for Scientific and Industrial Research (NISIR) and of late Mulungushi University also undertake research. Thus innovations are locally undertaken through the above institutions.

In July this year, the Forum for Agricultural Research in Africa (FARA), in partnership with the German Government represented by the Center for Development Research (ZEF) of the University of Bonn under its 'One World No Hunger' initiative, entered into an agreement with ZARI in implementing the Programme of Accompanying Research for Agricultural Innovations (PARI). ZARI is currently playing the role of Lead Implementing Institution (LII) for the PARI in Zambia.

### **1.5.2 Innovation platforms**

*- pending further information -*

### **1.5.3 Extension system and organizations**

*- pending further information -*

### **1.5.4 Private R&D activities**

*- pending further information -*

## **1.6 Key challenges, emerging needs and potentials in the agricultural sector**

The agriculture sector continues to face several challenges such as:

- Low agricultural production and productivity;
- Erosion of indigenous livestock and plant genetic resources;
- Low private sector participation in agricultural development, especially in agricultural marketing;
- High levels of food and nutrition insecurity particularly at household level;
- High dependence on rain-fed agriculture, exacerbated by low levels of irrigation especially by small scale farmers;
- Diminished investment in agricultural research and development (R&D);
- Inefficient agricultural extension service delivery;
- Low levels of agricultural mechanization among smallholder farmers;
- Inefficient agricultural markets for inputs and outputs;
- Limited access and availability to agricultural finance and credit facilities;
- Reduced net value of agricultural exports particularly for horticulture, floriculture and fish products although the overall value of non-traditional exports has been rising due to included exports of timber, honey and handcrafts;



- Unsustainable use of natural resources and low resilience to effects of climate change; and
- Inadequate mainstreaming of gender and governance issues, and HIV/AIDS.

In the continued effort of enhancing the performance of the Agricultural Sector, the Vision of the revised NAP is: *“To attain sustainable agricultural production which will enhance competitiveness, profitability, food and nutrition security and contribute to employment and income generation, national economic development and contribute to poverty reduction by 2020”*.

To support and/or complement the implementation of the National Agricultural Policy (NAP) and the Vision 2030, Zambia has signed the CAADP Compact and formulated the Zambia National Agriculture Investment Plan (NAIP) 2014-2018, under CAADP. The NAIP seeks to identify priority investment and policy changes that would result in robust agricultural growth that lessens the incidences of rural poverty.

Based on the general approach (see Africa-wide study Chapter 4) and in pursuit of efficiency and effectiveness, investment by Germany into the agricultural and food sector are suggested in those African countries, which:

- Show actual progress in sustainable agricultural productivity driven by related innovations, as indicated by comprehensive productivity measurement and innovation actions on the ground;
- Have a track record of political commitment to foster sustainable agricultural growth, as indicated by performance under CAADP, and
- Prioritize actions for hunger and malnutrition reduction and show progress, but where agricultural and rural development and nutrition interventions are likely to make a significant difference, as indicated by public policy and civil society actions.

Based on this approach, investment into the agricultural and food sector of Zambia can be expected to have only a modest effect on food and nutrition security improvements in the country.

**Table 6: Country level Performance Indicators**

| Indicator   | Index | Performance (%) |
|---|-------|-----------------|
| 1. Number of Years with more than 6% agricultural growth (2005 to 2014)     | 2     | 20              |
| 2. Percentage point change in TFP index between 2001 and 2008               | 27    | 100             |
| 3. Number of years with more than 10% government expenditure (2005 to 2014) | 3     | 30              |
| 4. Average share of agricultural GDP spent on R&D (2005 to 2011) in %       | 0.4   | 38              |
| 5. Steps in CAADP completed   | 5     | 63              |
| 6. Percentage point improvement in undernourishment between 2001 and 2011   | -4.9  | 0               |
| 7. Global hunger index (2014)   | 23.2  | 100             |
| Total score (weighted)  |       | 51              |

Source: Own computation based on World Bank (2015), FAO (2015), ASTI database and von Grebmer *et al.* (2014)

Note: the % performance (rounded) is defined as follows for the respective indexes: 1. % out of 10 years; 2. classes: if <1, or negative= 0; 1 – 7= 30, 8-15= 60, > 15= 100; 3. % out of 10 years; 4. % of the AU target value of 1% spent on R&D; 5. % of

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the desired 8 steps; 6. classes: if < 2 = 0; if 3-5= 30; if 6-10=60, if>10=100; 7. classes: if < 12= 0; 12-16: = 60; 17-20: = 60; > 20= 100.

Total score (weighted) performance and need to invest: (sum of (1.+2.)/2 (expected growth performance); + sum of (3.+4.+5.)/3 (expected government commitment); + sum of (6.+7.)/2 (performance in food and nutrition security and need)) divided by 3.

### Results of assessment (Table 6)

#### Expected agricultural growth performance:

- Zambia has increased its agricultural growth by more than 6% of the CADDP target only for two years between 2005 and 2014 ([www.resakss.org](http://www.resakss.org));
- However, Total factor productivity in Zambia had improved by 27% between 2001 and 2008 (Fuglie and Rada, 2011), indicating substantial improvement in the innovation performance of the country.

#### Government commitment:

- Zambia has a track record of political commitment to foster sustainable agricultural growth by being modestly active in the CAADP process and having completed five out of the eight steps in the CAADP process ([www.resakss.org](http://www.resakss.org));
- However, the Zambia government has invested more than 10% of total government expenditures (CAADP target) in the agriculture only for three years between 2005 and 2014 ([www.resakss.org](http://www.resakss.org));
- In addition, Zambia spends only 0.4% of its agricultural GDP on agricultural research and development, which is much lower than the Sub-Saharan Africa average ([www.asti.cgiar.org](http://www.asti.cgiar.org)) and the AU target value of 1% spent on R&D. This indicates that Zambia's investment on agricultural innovation is not yet sufficient.

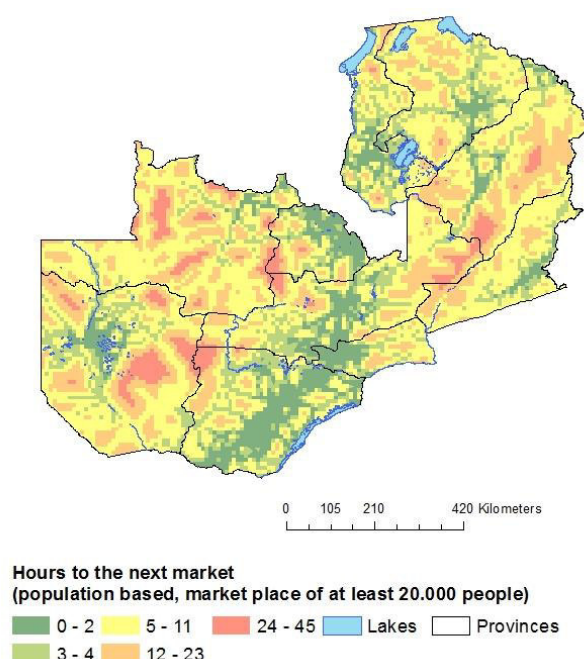
#### Food and nutrition security progress and need:

- Zambia is not prioritizing actions for hunger and malnutrition reduction and even the prevalence of undernourishment increased by about 5%, between 2001 and 2011;
- In addition, Zambia has a very high GHI score value of 24.4, reflecting an alarming level of hunger (von Grebmer *et al.*, 2014)<sup>1</sup>. This makes the investment into the agricultural and food sector in Zambia very urgent to fight the high numbers of food insecure people.

Overall, the economic, political, and social/nutrition framework in Zambia suggests modest investment into the agricultural and food sector of the country.

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<sup>1</sup> GHI score Values less than 5.0 reflect low hunger, values from 5.0 to 9.9 reflect "moderate" hunger, values from 10.0 to 19.9 indicate a "serious" level of hunger, values from 20.0 to 29.9 are "alarming," and values of 30.0 or greater are "extremely alarming"(von Grebmer *et al.*, 2014).

**Figure 7: Distance to market**

Data sources: Hours to next market - HarvestChoice, 2015;

Administrative areas: <http://www.gadm.org/>, accessed 20.9.2015

Inland water bodies: <http://www.diva-gis.org/gData> (water bodies), accessed 20.9.2015

Transportation intensive products should be promoted in areas indeed are well connected to markets, whereas the remote areas should focus on low volume and livestock value chain segment.

## 2 Most relevant value chains in Zambia

The value chain approach (VCA) is becoming a popular mode for agricultural development in Zambia. The VCA framework utilizes participatory methods to engage chain actors/participants as well as their facilitators in carrying out the mapping and analysis and encourage the chain actors to work together in order to improve performance in the entire value chain. Value chain approaches are based on models that focus on addressing critical challenges or constraints and opportunities in a selected value chain. VCA also aims at obtaining more detailed information on the various chain functions, actors, activities, costs, processes, opportunities and risks related to the flow of a particular commodity and its associated services; starting with the input suppliers, producers and ending with the targeted consumers.

Undertaking a Value Chain analysis is of assistance in:

- Creating a common or shared vision among chain players/actors and helps in identifying challenges and opportunities, thus facilitating the development of collaborative relationships;
- Promoting enterprise development;
- Enhancing food quality and safety;
- Determining the quantitative measurement of value-addition and understanding of the distribution of returns amongst the various players;

- Promotion of coordinated linkages among the value chain actors e.g. producers, processors and marketers;
- Improving of an individual firm's competitive position and/or share in the commodity market.

Below are some of the important and emerging value chains in Zambia:

## **2.1 AIC value chains**

The value chains chosen for the Agricultural Innovation Centers (AIC) include soybean (together with maize/cotton) and groundnut (together with bean).

### **2.1.1 Maize value chain**

Maize is Zambia's main staple food, particularly prepared in the form of a 'thick porridge' called *nshima*. Maize also receives the most support in terms of the government's budgetary allocation and provision of other agricultural services, compared to other agricultural commodities reflected in the National Food Balance Sheet (FBS). However, urban consumption observations are indicating some changes in preference, especially among the youths. Among a good number of urban youth consumers, rice and wheat products e.g. bread, are becoming preferable substitutes for maize.

Maize is also the most prominent crop among the small- and medium-scale farmers and contribute about 80% to the total national maize production. The maize value chain also apparently has the highest number of actors in its value chain functions, i.e. input suppliers, producers, processors traders and consumers. The crop is grown in nearly all provinces of Zambia, even where it is not agronomically recommended. Some few commercial farmers also grow maize for livestock feed and sometimes as a winter crop, under irrigation, for human consumption when a short-fall in production is anticipated.

Maize is the major crop bought for and stored/preserved as the national food strategic reserves by the Food Reserve Agency (FRA). Currently maize also forms one of the main raw materials in the Zambian livestock feed mill industry, with the bulk of it being poultry feed.

### **2.1.2 Soybean**

The soybean value chain is providing a promising opportunity for entrepreneurship and food and nutrition security in Zambia. This is largely through its potential for growth as demanded by predominantly the livestock feed industry, particularly the poultry sub-sector, and the increasing acceptability for human consumption as it provides high quality nutrition (proteins) at much lower cost than the most common proteins sources.

Zambia is self-sufficient (net exporter) in soy production – production for the year 2009/10 estimated at about 112,000 metric tons while consumption is estimated at 90,000 metric tons (Technoserve, 2010). This production and export of soy in Zambia is dominated by commercial farmers (85% of production). Growth in production has largely been achieved by increase in area planted rather than yield increase, despite volatility as the market has grown (ibid). The growth for soybean in Zambia is also promising because of the excess processing capacity accompanied with good vertical integration (such as with livestock feed manufactures).

Despite this strong export market opportunities in Zimbabwe, South Africa and Democratic Republic of Congo, several constraints continue to hinder soy value chain in Zambia, including (Technoserve, 2010):

- Relatively high cost base;
- Poor transport infrastructure and an uncertainty in the export policy;
- Inaccessible inputs, and technical knowledge (especially with quality issues) for smallholder farmers;
- High transport costs pose challenges for the import/export market opportunities.

### **2.1.3 Groundnuts and common beans**

Groundnuts and common beans are primarily small-scale farmer crops grown by over half a million Zambian households. Approximately 80% of these food crops are consumed at household level or within the local area. Most of the surplus crops enter the informal market chain. There is, however, major potential market demand for both crops in terms of regional and international markets provided that these crops are produced, harvested and processed according to market specifications.

Zambia's climate and soil conditions are ideal for growing groundnuts. In the 1960s and 1970s Zambia was a major exporter of premium-grade groundnuts to the European confectionery market. However, in the 1980s, the private sector was unable to fill the void left by the dismantling of the State-owned parastatal companies such as the National Agricultural Marketing Board (NAMBOARD), which led to a decline in seed germination, lower yields, loss of sorting and grading capacity, increased aflatoxin levels, and loss in farmer, trade and customer confidence.

## **2.2 Other relevant value chains**

### **2.2.1 Cassava**

Cassava is the other dominant national staple food crop, after maize, and one of the main food security crops in the country. It is mainly produced in Northern, Muchinga and Luapula Provinces, as well as in some areas of Western and North-Western Provinces. The crop is almost exclusively produced by smallholder farmers. It is mostly used for home consumption (with over 94% of the production consumed). Currently only around 8% of the produced crop is actually marketed locally as fresh root or sold as dried chips mainly into informal markets in Lusaka and Copperbelt Provinces. Some regional exports of dried chips take place to the Democratic Republic of Congo (DRC) mainly through informal cross border markets, such as at Kasumbalesa.

Cassava has a number of advantages compared, for instance to maize, and is thus very much suited for small-scale farmer production in that:

- It is a low input crop (no/limited fertilizer requirement, no annual seed purchase, etc.);
- A large number of small-scale farmers in the high cassava production areas have good production knowledge of cassava;
- It is not affected by drought as it able to tolerate long periods without rain (once it is established);

- It is also mainly grown in high/reliable rainfall areas.

In trying to promote commercialization of cassava, the government has developed a National Cassava Development Strategy. This is being cognizant of the fact that besides it being one of the main food security crops in the country, a number of market development opportunities exist, which have the potential to create substantial additional market pull for cassava; such as being used in starch production, in feed mill, for beer brewing, milling industry, etc.

Cassava commercialization (through product/market development) is expected to lead to increased incomes through increasing the proportion of the crop that is marketed, which will lead to increased production (market pull). Commercialization of cassava is also expected to lead to increase in the geographical coverage of cassava production areas, providing additional small-scale farmers with both increased incomes as well as food security. Cassava is also a major world food crop with global production in excess of 230 million tons per year, with the four major producing countries (Nigeria, Brazil, Indonesia and Thailand) producing almost half the world crop.

However, the commercial exploitation of cassava in Zambia is hampered by factors such as:

- Government maize price subsidies that create barriers-to-trade. The current Food Reserve Agency (FRA) discounted price distorts the market and makes it very difficult for cassava chip farmer/processors to compete (major feed-mill companies are willing to substitute thousands of tons of maize with cassava they can purchase it for 70% maize price);
- High transport costs, as most cassava is grown far (Luapula, Northern, Muchinga and Western Provinces) from Zambia's manufacturing centers;
- Lack of product consistency: failure to secure a regular market, poor procedures, ineffective quality controls and/or lack of farmer awareness has led to non-commercial inconsistent product quality / specification;
- Lack of traceability: to protect their reputation, share-value, profits and to avoid litigation, large food companies demand suppliers to provide clear detailed evidence showing all food ingredients' origin.

### **2.2.2 Wheat and rice value chains**

Wheat is predominantly produced by large-scale/commercial farmers, and as an irrigated crop. Zambia has normally had surplus wheat production. On the other hand, rice is predominantly grown by small-scale farmers.

Being a more convenient food to cook and consume, rice is increasingly becoming a mainstream alternative to the traditional staples such as maize and cassava, which are however still eaten by large populations in Zambia and all across Africa. There is also growing awareness in the country that the rising demand for rice is not transient, but rather a part of a general trend being seen across the African continent in food consumption patterns, arising from the increasing urban and predominantly young populations. In responding to this trend, Zambia has developed the National Rice Development Strategy (NRDS): 2015-2019, whose overall strategic objective is to increase local rice production by at least 50% and also to enhance its competitiveness on the market. Additionally, in recognition of the growing importance of rice as a national cereal staple, the government has designated it as

one of the two food commodities which the FRA purchases for the national strategic food reserves.

Rice has reportedly been cultivated in Zambia at a subsistence level for quite a long time but is currently being grown as a cash crop by smallholder farm families and thus offers great potential to contribute to income and employment in the country, especially in the rural areas. The observed strong supply response to diversify into rice production by the smallholder farmers, is not only due to the incentive created by rising consumer demand in the country, but also by the little expenditure on rice inputs compared to, for example maize or cotton, under the traditional farming system they practice.

The leading provinces, in terms of percentage contribution to aggregate national production are Western, Northern, Muchinga, Luapula and Eastern Provinces. According to the Ministry of Agriculture and the Central Statistical Office's Crop Forecasting Survey results, over the last six years, the area under rice cultivation has averaged about 36,144 ha, of which Western Province accounted for 43%, Northern Province 31%, Muchinga Province 17%, Eastern and Luapula Provinces 4% each, and the rest of the provinces 2%.

### **2.2.3 Aquaculture**

Zambia, with funding provided by the Food and Agricultural Organisation (FAO), developed a National Aquaculture Strategy in 2004. The National Aquaculture Strategy proposes means and methods of addressing critical issues relating to aquaculture development through input supply (i.e. production and delivery of feeds and seeds as well as the availability of farm credit) and access to extension support and markets. The National Aquaculture Strategy was later followed with the formulation of National Aquaculture Development Plan: 2009-2011.

Aquaculture (fish-farming) is currently gaining prominence especially with the depletion of fisheries resources from the country's natural water bodies. Aquaculture is practiced and thus being promoted, among both commercial and small-scale fish farmers, in impoundments, reservoirs and dams; earthen ponds (small and large); and in cages.

Most commercial fish farms are located in Southern, Lusaka and Copperbelt Provinces. On the other hand, small-scale fish farmers are concentrated in Northern, Northwestern and Eastern Provinces (constitutes 80% of the total). The number of small-scale farmers taking up fish farming has been increasing rapidly over the years due to the activities of aquaculture projects being undertaken in the Country.

The production systems and practices of fish farming in Zambia are diverse, ranging from extensive to intensive practices and from multi-species to mono species, with no clear distinctions and levels of practice generally overlap.

### **2.2.4 Fresh Fruits and Vegetables (FFV) Value Chains**

Promoting commercial production of fresh fruits and vegetables (FFV) and increasing access to markets for smallholder farmers have been identified as key drivers for stimulating inclusive economic growth and reducing poverty that is prevalent in rural and peri-urban areas within Zambia. The attractiveness of a strategy of commercializing FFV production among the small-scale farmers is principally on account of high potential to increase incomes, create both direct and indirect employment opportunities. Equally important is the possibility involving the resource-poor member of farming households such as the women,

the youth, people living with HIV/AIDS and thus provide them with opportunities to enhance their food security.

### **3 Innovations in value chains in the past 20 years**

*- pending further information -*

#### **3.1 The most crucial limiting factors in Zambia / AIC-region / in AIC value chains**

*- pending further information -*

#### **3.2 The most important / beneficial innovations in the relevant value chains**

*- pending further information -*

##### **3.2.1 AIC value chains**

*- pending further information -*

##### **3.2.2 Other value chains and cross-cutting innovations**

*- pending further information -*

#### **3.3 Most promising approaches for farmer and small business related value chain innovations**

*- pending further information -*

### **4 Considerations for Effective Zambia-German Collaboration in Agricultural Research and Development**

#### **4.1 Promising Agricultural Products and Value Chains.**

Besides assessing the returns of investments into institutional innovations in Zambia, analysis to choose the most promising value chains in the country is also undertaken. In compliance with the availability of data and the purpose of the study four criteria that focus on poverty and market potential are used to select the five most promising agricultural products from the long list of agricultural products the country produces and sells. The first indicator, the trade potential (revealed comparative advantage (RCA) index), is computed to identify value chains over which the country has revealed (but not potential) comparative advantage. In the present case, the RCA index compares the share of a given agricultural product in Zambia's export basket with that of the same product in total world exports. The second indicator, yield gap, is used to assess the expected return of the envisaged Germany investment on the given AIC country value chains. A third indicator, average yield growth, is used to examine the Potential of the product for poverty reduction. The production share of total supply is also used to assess the present integration of the poor in the market (relevance).

The summary of the five most promising value chains based on Revealed Comparative Advantage (RCA) index, average yield growth and relative yield gap is reported in Table 7



below. The production share, RCA index, actual yield growth and relative yield gap for the GIZ-selected value chain(s) is also reported at the bottom of the table, when they are not included in the list of the first five most promising value chains.

**Table 7: Selection of promising agricultural products /value chains**

| Rank by RCA  |                              |                  | Rank by Yield progress*** |   | Rank by yield gap              |                          | Rank by relevance of crop    |                                    |
|--------------|------------------------------|------------------|---------------------------|---|--------------------------------|--------------------------|------------------------------|------------------------------------|
| Rank         | Name of agricultural product | RCA index (2012) | Name of the crop          | Average annual yield growth (2005 to 2012 ) | Name of staple crop (rain fed) | Relative yield gap (%)** | Name of agricultural product | Production share of supply (2012)* |
| 1            | Oil, olive residues          | 77               | Ground-nuts, with shell   | 11  | maize                          | 86                       | Cottonseed Oil               | 200                                |
| 2            | Cotton linter                | 70               | Soybeans                  | 6   | millet                         | 89                       | Soybean                      | 180                                |
| 3            | Bran, maize                  | 56               | Maize                     | 6   |                                |                          | Sugar                        | 113                                |
| 4            | Tobacco, unmanufactured      | 10               | Wheat                     | 5   |                                |                          | Cassava , products           | 100                                |
| 5            | Beans, green                 | 9                | Sweet potatoes            | 5   |                                |                          | Sweet potatoes               | 100                                |
| GIZ selected | Groundnuts, shelled          | 0.04             |                           |   |                                |                          | Groundnut Oil                | 100                                |
|              | Soybeans                     | 0.02             |                           |   |                                |                          |                              |                                    |

Source: \* Own computation based on FAO 2015 data, \*\* from Van Bussel *et al.* (2015).

Note: \*\*\* a minimum of 0.5% production (volume) share threshold is used as a screening (crop relevance) criteria.

#### Results of assessment (Table 7):

- The trade potential (revealed comparative advantage (RCA) index) is high for olive oil residues, cotton linter, maize, unmanufactured tobacco and green beans. This indicates that Zambia has comparative advantage (in the export) of these commodities. The RCA value for the GIZ selected crops is much lower than 1 indicating that Zambia has comparative disadvantage (in the export) of all the GIZ crops namely soybeans and ground nut.
- The yield performance indicating progress suggests that over the CAADP period (2005 to 2012) the GIZ selected value chains( groundnuts and soybeans ), maize, wheat and sweet potatoes are the five most promising crops.
- Yield gaps indicate potentials from another angle, and is observed to be high for rain maize and millet indicating the high potential return of investing on these value chains.
- In terms of relevance (production share of supply) cottonseed oil, soybeans, sugar (raw equivalent), cassava and sweet potatoes are the leading. The total production of the first two products exceeds the total supply. The full supply of the latter three and ground nuts (the other GIZ selected value chain), is also fully produced in the country.

#### **4.2 A systematic assessment of promising partnerships for each promising innovation area**

With Zambia's high potential for agricultural development and diversification from the mining sector, for economic growth and poverty reduction, there is a huge scope for a long standing collaboration between Zambia and Germany. Therefore the cooperation and/or collaboration between Zambia and Germany through PARI should be harnessed.

The scaling-up of the innovation platforms in the different countries is a major partnership area which the countries will like to explore with stakeholders from Germany. This will however be best placed along the strategic commodities and themes in the different countries.

The Zambian agricultural development policies, strategies and plans have identified a number of prime commodities and value chains to be given attention and priority. Zambia appears to be behind in terms of innovation platforms, thus following the signing of the Agreement between FARA and ZARI, needs close follow-up with Germany, in order to identify and come up with appropriate innovation platforms and/or technology generation along these commodities will be a vital route for collaboration for impact.

#### **4.3 Some potential partners for the German collaboration: in science and research, private sector and NGOs and governmental organizations**

A good partnership framework is essential to bring the German–Zambian collaboration to fruition. Besides ZARI, other prospective partners with Germany in Zambia will include the Ministry of Agriculture and Livestock, the Universities, and the farmers' organisations/ associations, the non-governmental organization and the relevant private sector.

#### **4.4 Needed implementation research**

The potential for German collaboration in fostering Zambian agricultural growth and development is enormous. This could range from research partnerships for technology generation and innovations through capacity building in order to develop pathways and systems for translating research outputs to development outcomes for positive socio-economic impact. The need to build external collaboration on existing progressive initiatives and the Government pathways for the development of the sector is very essential for complementarity and synergy.

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