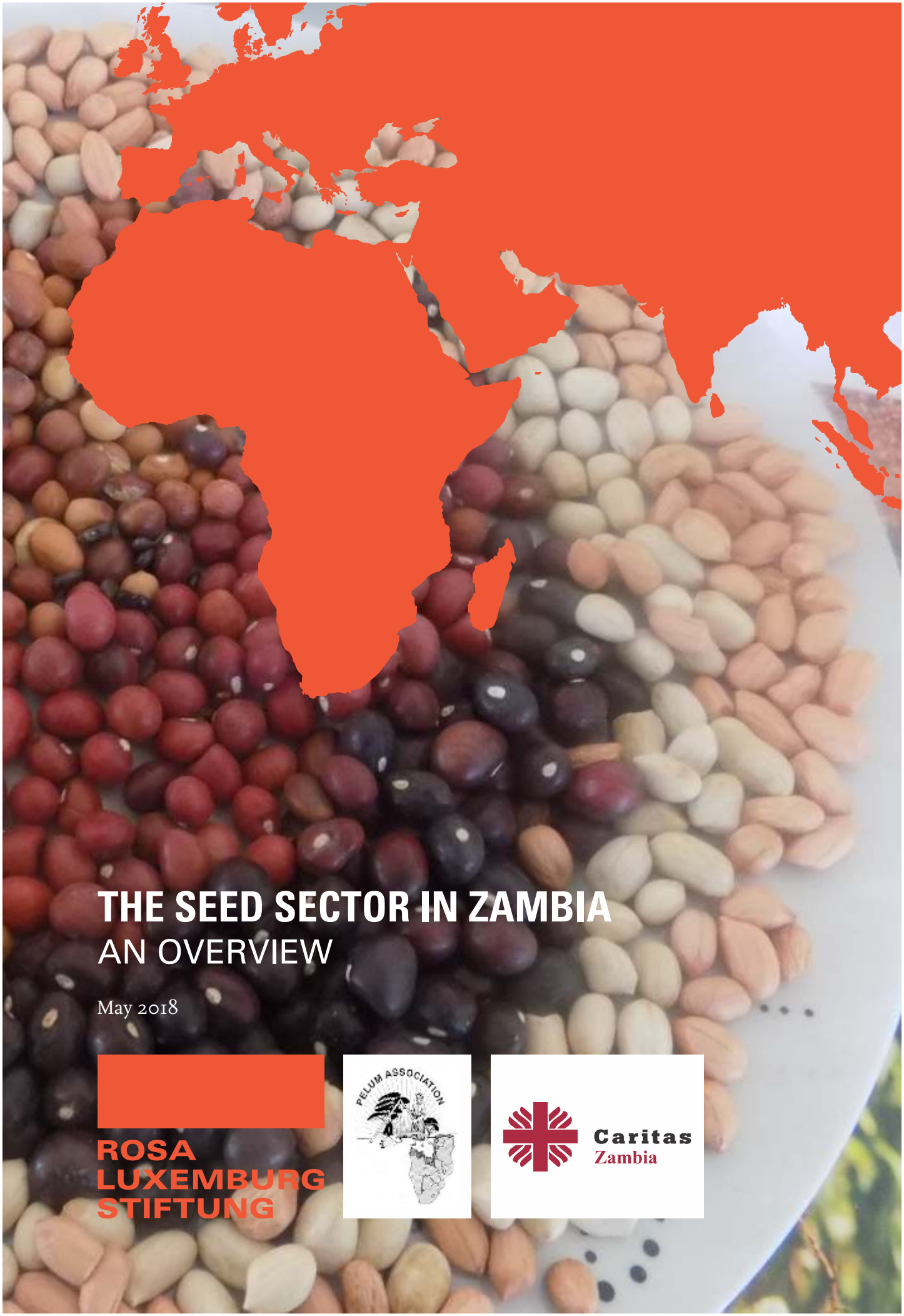

THE SEED SECTOR IN ZAMBIA
AN OVERVIEW

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Executive summary

Zambia's maize seed industry is currently one of the strongest and most competitive in Sub-Sahara Africa. The seed sector in Zambia is highly pluralistic and divided into the formal and informal sector. The informal sector is mainly comprised of farmer managed seed systems (FMSS) and some Non-Governmental Organizations (NGOs) that seek to promote the sector. In this system, farmers are free to share and exchange their seeds for both monetary and none monetary items such as food items or labor. Furthermore, the informal seed sector represents a rich cultural heritage of Africa's local communities. However the push to transform the seed sector into income-generating commercialized entity owned by a few and to marginalize traditional seed varieties, is still making more headway on paper than in practice.

The other side is the formal sector which is monopolized mainly by foreign multinational companies. These seed companies have different stakes in the seed sector with some having more influence on policies and legislation governing the seed sector in comparison to that exerted by the informal sector. Most of these companies are foreign-owned and do not serve the interests of the local seed industry but focus more on corporate profits. The interests of these companies are neither farmer-based seed systems nor do they support farmers' rights.

This study aims to analyze the political and socioeconomic dynamics of the seed sector in Zambia and to give an overview of the legal frameworks, key actors and policies in the sector. It unpacks the critical social, economic, and political issues that surround the seed sector in Zambia. Based on interviews with stakeholders, the major challenges are identified and strategic interventions in line with identified political and socioeconomic dynamics are proposed.

From the findings of the study, the following are some of the key recommendations:

- There is a need to establish a link between the formal and informal seed systems where both private seed enterprises and public institutions have to play an active role. In order to ensure that the research generated from the enterprises are responding to the farmers' needs, Government should consider regaining control of these enterprises. Government could for example through a majority of shares in the enterprises. These enterprises should be structured in a way that farmers can participate, encourage seed diversity, food and nutrition security as well as reduce monopoly by multinationals. This is key in developing seeds based on the diverse conditions and needs of smallholder farmers, reducing poverty and creating employment, which according to the findings is not being realized within the seed sector.

- There is need for government to provide incentives to local seed companies promoting traditional and indigenous seed that wish to venture into the seed sector so that farmers participate in the seed sector and enhance indigenous crop diversity for food security. There is also need to include civil society organizations, farmer organizations, and the private sector at the same level, in the formulation of seed laws and regulations. As the study has shown, private seed companies have significantly better options and opportunities to articulate their voices and interests in policy processes as well as to fund their cause over a wider geographic spread.

- 87% of the private seed companies were not willing to give out information. As such, there is need for government to take deliberate steps such as putting in place mechanisms that ensure that there is transparency in all business operations in the seed sector to enhance the upholding accountability and social responsibilities. The position of this paper is that there are no clear guidelines and systems in place to regulate the seed sector. There is an urgent need for a seed policy to be enacted in order to regulate the seed sector. A participatory approach in the finalization of the policy will assist in defining and harmonizing participation of the formal and informal seed sectors.

- Government needs to invest more in the creation of markets of diverse crops which may perform better than maize, such as small grains like millet and sorghum, and traditional vegetables, as such there is need for a deliberate policy for other crops that are at the verge of extinction.

- There is need for further research to establish the effectiveness of government in regulating and monitoring the seed sector. This is important as it will bring out gaps and recommendations that will enhance the development of the formal and informal seed sector in Zambia.

1. Background and Methodology

1.1 Introduction

Seeds constitute the main component of agriculture at any level of the production chain in both crop and animal production, and has been central to human's agriculture development for many thousands of years. For most of the history of agriculture, seed was considered a common heritage to be used as and when desired by any member of the community. This heritage had no geographical boundaries and even strangers had unhindered access to seed. Over time productive seed varieties would spread over long distances. This unhindered access to seed contributed to development of varieties over many generations which were suitable to the local conditions and could perform well. However since the late 1950s and early 60s, significant development of commercial varieties including hybrids began, as seed was now being developed to grow under certain soil and environmental conditions. This was the beginning of the development of the commercial seed sector. Plant Breeders had access to seed from all over the world, crossing breeds and thereafter resulting in many commercially bred hybrids. These hybrids were developed under a capitalist system with a primary aim of maximizing profit.

Since the 1960s, plant breeders have grown in terms of influence on the seed sector. We have noted that the private sector has a much higher level of influence on most Governments' policy than farmers who should rightly be the custodians of the seed. Private companies have influenced government policy so that it supports them in the maximization of profit at any cost. The desire to maximise profit resulted in Plant Variety Protection laws (PVP) put in place to protect the rights of breeders. The PVP and Plant Breeders Rights legislation were introduced first in Europe and America and later spread to other regions. The legislation developed was designed to suit only the varieties being developed by breeders and not the traditional varieties predominantly bred by farmers. During this whole period of development of plant breeding and seed regulations, seed from farmers' local varieties was still treated as a common heritage but seed from plant breeders had a significant cost. Plant Breeders could take local farmer varieties, isolate certain genes, and patent the outcome without payment of any money that would benefit the “common good” of humankind and communities, in respect of these seeds having originally been common heritage. However, the plant breeders generated tremendous income from selling the patented seed. Furthermore, seed from plant breeding needed a market but the large potential market (smallholder farmers) relied on their own seed and could not in any case afford the expensive proprietary seed.

1.2 The seed sector in Zambia

The seed sector in Zambia is highly pluralistic and divided into the formal and informal sector. The informal sector is mainly comprised of farmer managed seed systems (FMSS) and some Non-Governmental Organizations (NGOs) that seek to promote the sector. The informal sector mainly promotes the propagation, consumption, and trade or exchange of traditional seed varieties which are plenty in Zambia. These are mainly composed of the open pollinated varieties[1] which farmers have the freedom to grow year in year out without the reliance on external seed supply. In this system, farmers are free to share and exchange their seeds. The at global and national levels push to marginalize the informal sector is still making more headway on paper than in practice. This is due to many complexities, one of which the growing awareness is of and popular resistance to the seed industry agenda. In Zambia, seed crops range from cereal crops, legumes, vegetables, tubers and root crops as well as fruit crops.

The other side is the formal sector which is monopolized mainly by foreign multinational companies. Since the 1980s, the seed sector was monopolized mainly by companies such as Seed Co, Zamseed, MRI, Pannar and Pioneer. Lately, a number of other companies have found their way onto the Zambian market through Foreign Direct Investment (FDI) such as Syngenta, Monsanto, Kamano, Good Nature, Afriseed, Klein Karoo, and Zambezi Seed after registration and certification with Seed Control and Certification Institute (SCCI). These seed companies have different stakes in the seed sector with some having more influence on the informal sector. Most of these companies are foreign-owned and do not serve the interests of the local seed industry but rather focus more on corporate profits and benefits. The interests of these companies are neither farmer-based seed systems nor do they do they take into account farmers' rights as their motivation is only profiteering. They make no effort to strengthen farming systems that are already functioning, but rather contribute to complex situations that form an elite category of farmers who enjoy short term gains.

Therefore, this study aims to analyze the political and socioeconomic dynamics of the seed arena in Zambia and give a detailed background of the seed sector in Zambia. Specifically, the study will delve into the global dynamics affecting the seed arena in Zambia, who the key actors are, and what influence they have in shaping the policy decisions made on seed. The study will also look at the impact of the decisions made at policy level on the different actors and the subsequent systems within the arena and the interactions that they have with each other.

1 *Open-pollination is when pollination occurs by insect, bird, wind, humans, or other natural mechanisms. Because there are no restrictions on the flow of pollen between individuals, open-pollinated plants are more genetically diverse. This can cause a greater amount of variation within plant populations, which allows plants to slowly adapt to local growing conditions and climate year-to-year. As long as pollen is not shared between different varieties within the same species, then the seed produced will remain true-to-type year after year (http://blog.seedsavers.org/blog/open-pollinated-heirloom-and-hybrid-seeds).*

1.3 Study Methodology

The study provides an account of factors which affect the effectiveness of the seed companies in delivering seed to farmers. The study seeks to explain the factors which impede the seed companies from performing this task effectively.

Both quantitative and qualitative instruments which included the semi-structured questionnaires and interview guides were used. The semi-structured questionnaire was used because the field of research was vast and the respondents were scattered over a very large area. An interview guide with a list of questions was used to collect data from the key informants. The information given by the interviewee was tested through cross-examination. Focus group discussions were also conducted in order to collect data from farmers and community members who are the users of the seed and are an integral component of the seed systems.

The sampling techniques employed in this research included cluster sampling and purposive sampling. The study had a total sample size of 50 respondents' representative of all key stakeholders. Key stakeholders included both private and government companies involved in seed production and these were sampled from Mount Makaulu, Seed Control and Certification Institute (SCCI), MRI, Monsanto, Klein Karoo, Afriseed, Kamano, Zambezi Seed, Farmers Barn, and Syngenta Seed Company amongst other stakeholders. Key informants were sampled from Lusaka District because it is in this district that most governmental seed companies have their headquarters, and other stakeholders such as private seed companies who are involved in seed production are also located there. Farmers were selected from the four districts (clusters) of Rufunsa, Chongwe, Mumbwa and Chibombo. The four districts were chosen because it is in these districts where there are a huge number of small scale farmers.

Further, secondary data was collected through desk research from various sources such as reports, journals, books, and online sources.

2. Seed laws in Zambia

2.1 Literature review

2.1.1 Overview

The seed sector in Zambia is governed by a number of institutions functioning under the Ministry of Agriculture including the Zambia Agricultural Research department and the Seed Control and Certification Institution (SCCI). The Zambia Agricultural Research department in the country has ten research stations with Mount Makulu Central Research Station functioning as the headquarters. The institute's main objectives are to develop and adapt crop, soil, and plant protection technologies, and to provide high-quality, appropriate, and cost-effective services to farmers. The research facility at Mount Makulu is one of Zambia's only two fully-equipped agricultural laboratories capable of detailed soil analysis and other agricultural testing.

The SCCI is a department under the Ministry of Agriculture and it is Zambia's seed certification authority and center for seed services in the country. The SCCI has three sections which include: variety testing, registration, and protection; seed inspection and seed system development; and seed testing. The institute has a number of functions which includes: The enforcement of the country's Plant Variety and Seeds Act of 1995, which provides for regulation and control through variety testing and release; production and marketing of seed; import of seed; seed quality control; and coordination of the seed industry. The SCCI also enforces the Plant Breeder's Rights Act of 2007, which ensures that breeders collect royalties appropriately from the use of their varieties.

2.1.2 Seed systems

The seed industry in Zambia includes the active participation by both the private and public sectors. The public sector plays the regulatory and limited technology development role whilst the private sector mainly does the breeding, improvement and business aspect of selling and distribution of seed Zambia's maize seed industry is currently one of the strongest and most competitive in Sub-Saharan Africa. Like most other African countries, the seed industry in Zambia consists of two major systems: the informal sector and the formal sector. The country policy briefs focus almost exclusively on the formal seed sector (Mabaya et al, 2017).The informal sector is highly dependent on the formal seed systems for inputs and technical expertise, but it does not in any way try to undermine the functioning of the formal seed sector. In contrast, it would appear that the formal seed sector does not want to recognise the important role that the informal seed sector has to offer.

In addition, as reflected in the 2016 country report produced by the United States of America Agency for International Development, it is clear that the seed systems are broken down into five predominant sub systems and these include:

- Farmer-saved;
- NGOs and cooperatives;
- public-private -cooperation of ZARI and local seed companies;
- private - supported by international seed companies and in other instances by out-grower scheme export commodities.

In the informal farmer-saved system, farmers themselves multiply and exchange seed locally, both through bartering and sometimes for cash. This system has no quality assurance measures for the landraces that are multiplied. In the second system, NGOs are assisting community groups or farmer cooperatives in seed multiplication and marketing. Smallholder farmers in Zambia who grow crops other than maize are nearly always acquiring seed through these two systems.

The country's agricultural focus on maize and increasingly soybean for export is similarly reflected in the three formal seed systems. The privately-owned local seed companies focus on seed production and marketing, often of varieties and basic seed bred from the Consultative Group for International Agricultural Research (CGIAR) research institutions. International seed companies operating in Zambia are active in breeding (within and outside of Zambia), seed production, multiplication, processing, and distribution of hybrid maize and other high-value cash crops. For the four priority crops in Zambia(maize, rice, groundnut and beans) there are 26 active breeders. From these, 15 breeders are from the private sector and 11 from the Zambia Agriculture Research Institute (ZARI). Furthermore, adoption of improved varieties is low across the country for all crops but maize. In addition, the overwhelming majority of varieties released in the country have been maize, and as such, the formal channel has been better established in maize than other crops to release improved varieties, and agro-dealers mainly focus on supplying maize seed. Therefore, these developments have resulted in limited government and NGO programs to distribute groundnut, common bean seeds, and other crop seeds.

2.1.3 Intellectual property rights and seed in Zambia

Evolution in science such as recent developments in biotechnology creates new challenges for patent regimes, leads to reforms in laws and regulations, and has led to the creation of property rights where none existed before. These new property rights imply new avenues of rents for firms and new types of strategic behavior. In theory, intellectual property rights, by giving inventors monopoly rights to their inventions, provide economic incentives for research and development. In exchange for the monopoly rights inventors reveal the methods behind their invention, which helps further the public good by fostering cumulative invention while imposing a cost on the company from revealing their secrets. This is a phenomenon which has just been introduced, however, it does not conform to the realities of the majority of smallholder farmers in Africa, and Zambia specifically.

The Small Holder Farmers have other challenges such as being fully integrated in markets and climate related calamities such as unpredictable rainfall patterns of Zambia has not being been spared. In the seed sector, a number of companies have claimed to have developed seed varieties and have patented them. The present exponential growth in biotechnological research is a byproduct of changes in both the technology and the availability of intellectual property rights for living organisms. The new paradigm in biotechnology patenting started after the landmark Supreme Court's 1980 Diamond v. Chakrabarty decision that allowed the patenting of life forms.

2.1.4 National Seed laws, Acts and regulations

A national seed policy was developed in 1999, which is still in draft and embedded in the second National Agricultural Policy: 2016-2020. The draft seed policy and Act provide a basis to regulate the seed sector through seed testing; seed crop inspection; variety registration; variety protection and enforcement of seed quality standards to facilitate seed trade; quarantine and other seed-related issues; multiplication, trading and the adoption of seeds of genetically modified crops; and the protection of plant breeders', farmers', and community rights (ISSD Africa, 2012).

The seed industry is regulated by various Acts. The Plant Variety and Seeds Act, which was enacted in 1967, initially only allowed for the participation of the public entities in the seed sector. This was amended in 1994 and 1995 to provide for private sector participation. The Act regulates the control of the production, sale and import of seed. In addition, it regulates and controls the export of seed, and seed testing, setting the minimum standards of germination and purity; and providing for the certification of seed, and for other incidental or related matters (ISSD Africa, 2012). What that means is that, the Plant Breeders' Rights Act provides for the protection of plant breeders' rights; the registration of plant varieties; and for other matters, connected or incidental. Further, while Zambia has enacted this Plant Breeders' Rights Act, it has not yet addressed farmers' rights and community rights individually, although they are partly covered in some sections of the Plant Breeders' Rights Act. However, currently the Seed and Plant Breeder's Acts are under review.

Further, Zambia has aligned its national seed laws to the Common Market for Eastern and Southern Africa (COMESA). Seed is the most critical input in agriculture production, and according to this development, there is potential to increase on-farm output to enhance both household and national food security. According to the COMESA 2014-2020 Strategy, the harmonisation is meant to increase seed production, reliability, trade, and competitiveness of the seed industry in the region. According to Mulenga (2017), agriculture contributed about 30% of COMESA's GDP which stands at US$550 million. However, about 120 million of the 510 million people living in the region suffer from food insecurity. Compounding this is the fact that only one in every four smallholder farmers has access to quality or improved seed. This affects the productivity of the smallholder farmers. Historically, the regulatory environment surrounding seed production and certification has made it costly and difficult for farmers to get access to and develop productive and resilient seed varieties.

2.1.5 Plant Variety Protection in Africa

Africa remains largely a market for patented and improved seed. As such there has been an onslaught of seed companies using the Green Revolution Model to penetrate the huge potential market for seed that exists amongst smallholder farmers. The Green Revolution discourages the use of farmer varieties, describing them as inferior to commercially bred varieties, and discourages the use of natural soil fertility and pest and disease control, instead promoting chemical fertilizers, pesticides, and herbicides. It is postulated that indeed only commercial varieties could perform when accompanied by chemical fertilizers and pesticides. The Green Revolution has disrupted the agricultural system that had been developed by farmers over many generations. It damaged the soils and environment and [thus] led to a spiraling degradation of household food and nutrition security, and proved costly and unaffordable for the target farmers especially in the developing countries (Biowatch: pg 14, 2016).

Governments in the northern hemisphere have been seen to be facilitating the corporate takeover of African food systems through various initiatives supporting the Green Revolution. An example is that of the G8 initiative called the New Alliance for Food Security and Nutrition, which is using money intended for poverty reduction to instead ease access to key African locations for some of the world's biggest companies, which already control much of the global food market (Kiwanga, 2015). These corporate companies have lobbied African Governments to ensure that they adopt globally agreed, stringent Plant Variety Protection laws as a pre-requisite to investment within agricultural systems. They have also guaranteed a market for their seeds through facilitation of national governments to purchase their inputs on behalf of the farmers. This has resulted in the Farmer Input Support Programme (FISP), increasing sale of proprietary seed. But now, FISP has created a cycle of dependence even when government cannot effectively implement the programme. As a result, farmers are now hooked to this proprietary seed and other accompanying inputs that they cannot afford. The seed companies are milking the farmers of their hard earned resources who in turn remain perpetually dependent on them.

Across the African Continent we have also seen the change in plant variety protection laws with some aligning to UPOV91 (see chapter 2.1.8). African governments are being co-opted into reviewing their seed trade laws and supporting the implementation of Plant Variety Protection (PVP) laws. The strategy has been to first harmonise seed trade laws such as border control measures, phytosanitary control, variety release systems and certification standards at the regional level, and then move on to harmonising PVP laws. The effect is to create larger unified seed markets, in which the types of seeds on offer are restricted to commercially protected varieties. The old traditional rights of farmers to replant saved seed from the previous crop are curtailed and the marketing of traditional varieties of seed is strictly prohibited. In that vein, some of the seeds produced by farmers may only be termed grain.

Table 1: Regional Seed Regulations

SEED LAWS	COUNTRIES (SIGNATORY OR MEMBERS)			
African Regional Intellectual Property Organisation (ARIPO)	Tanzania	Kenya	Malawi	Zambia
SADC draft PVP protocol	X	X	X	X
Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement	Subscribes	Signatory	Signatory	Signatory
Union for Protection of New Varieties (UPOV)	Member	Member		Member
Plant Breeders Rights Act	Enacted in 2014 and disregards the contributions of small-scale farmers	Signatory	Signatory	Signatory
COMESA Seed policies	Aligned its national seed laws to the (COMESA) seed policies	Aligned its national seed laws to the (COMESA) seed policies	Aligned its national seed laws to the (COMESA) seed policies	Aligned its national seed laws to the (COMESA) seed policies

The SADC PVP protocol, like the equivalent legal instruments of ARIPO and OAPI (noted in the above table), intends to establish a protection system modelled after UPOV 1991 in the SADC region. The main features of this protocol are the same as those of the ARIPO and OAPI. Table 2 below compares the three regional laws on farmers' rights to re-use seeds from varieties protected under regional seed laws;

Table 2: Comparisons of the regional seed laws

	RANKING	DETAILS
ARIPO	Worst	Farmers can only re-use seed on their own farm, for certain crops only and by paying royalties
SADC	Second worst	Farmers can only re-use seed on their own farm and only by paying royalties.
OAPI	Least worst	Farmers can only re-use seed on their own farm

Source: GRAIN article 5121-land and seed laws.

All SADC countries, except Angola, are members of ARIPO. This means that the PVP protocols of both organisations will apply in eight countries. It is not clear whether seed companies will be able to get double protection on their varieties under the two instruments simultaneously or have to choose one or the other. The economic implications for farmers in terms of their right to save and re-use seeds depending on either outcome will be quite serious. The chief concern on this protocol is that UPOV 1991, on which the SADC protocol is based, is a restrictive and inflexible legal regime that grants extremely strong intellectual property rights to commercial breeders and undermines farmers' rights.

2.1.6 Southern African Development Communities (SADC) technical agreements on harmonization of seed regulations

The objective of the agreements is to facilitate seed trade in the SADC states and increase the availability of so-called improved seeds from the private sector. Through the variety release system, a SADC seed catalogue has been established and seed of varieties listed in the catalogue can be traded in all SADC member states with no restrictions. However, a variety cannot be listed in the regional catalogue until it is released nationally in at least two SADC countries. And it must fulfil the criteria of distinctness, uniformity and stability (DUS) plus value for cultivation and use. For farmers who are used to working with traditional seeds of local varieties, this represents a very complex system. Given that the harmonisation aims at generalising the use of industrial and uniform seeds, the informal seed system of farmers will be in jeopardy. SADC does aim to document traditional varieties in its seed database but the agreements are silent on who is entitled to register these materials and what the objective is of such registration.

2.1.7 Common Market for Eastern and Southern Africa (COMESA) seed trade harmonization regulations

The COMESA seed trade regulations were drawn up with the help of the African Seed Trade Association and approved in September 2013 by the COMESA Council of Ministers. Their main objective is to facilitate seed trade among the 20 member states of COMESA by pushing these states to adopt the same standards for seed certification and phytosanitary rules, and by establishing a regional variety catalogue containing the list of authorised seeds to be marketed and grown in the region. The standards promote only one type of plant breeding, namely industrial seeds involving the use of advanced breeding technologies.

Like in other regional seed harmonisation initiatives, the COMESA seed regulations make trans-boundary movement of non-registered seeds illegal. Only approved varieties (that are distinct, uniform and stable (DUS) can move from one country to another. Farmers' seeds, local varieties, and traditional materials will fall outside this net and therefore become marginalised. The regulations therefore have the effect of entrenching existing bans in many countries on the marketing of both farmer and unregistered varieties within national boundaries.

The COMESA seed trade regulations is to be implemented by eight member states who are simultaneously members of SADC, who have also adopted a set of Technical Agreements on Harmonisation of Seed Regulations (see 2.1.5). This set of Agreements differs from the COMESA regulations in aspects relating to the registration of traditional varieties and the registration of genetically modified (GM) varieties.

The incompatibility between these regulations may raise practical difficulties. Further, the COMESA seed regulations are binding on all COMESA Member States in terms of article 9 of the COMESA Treaty. Yet there is no evidence that governments have consulted the citizens in COMESA countries in an appropriate way, particularly small-scale farmers, despite numerous pleas to COMESA to consult with small farmers. As such, most of these regional seed laws will most certainly increase seed imports, reduce breeding activity at the national levels, facilitate monopolisation of local seed systems by foreign companies, and disrupt traditional farming systems upon which millions of African farmers and their families depend for their survival.

2.1.8 Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is an international treaty that governs the movements of living modified organisms which results from modern biotechnology from one country to another. The protocol was adopted on 29 January 2000 and Zambia signed it on 27th April 2004. The protocol establishes an advance informed agreement procedure in order to ensure that countries are provided with the appropriate information to make informed decisions prior to agreeing to the importation of such organisms into their territory. This protocol also establishes a biosafety clearing house to facilitate the exchange of information on living organisms and to assist countries in the implementation of the protocol.

2.1.9 Union for the Protection of New Varieties of Plants (UPOV)

The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization which was established by the International Convention for the Protection of New Varieties of Plants. The objective of the Convention is the protection of new varieties of plants through an intellectual property right. It provides a sui generis form of intellectual property protection which has been specifically adapted for the process of plant breeding and has been developed with the aim of encouraging breeders to develop new varieties of plants. The uniqueness of varieties being applied for release is evaluated in comparison to those of common knowledge. This ensures that only novel, uniform, and stable varieties are released for commercial production in Zambia. The test is done in accordance with the Test Guidelines of UPOV. Zambia is not yet a member of the UPOV has been in contact with the Office of the Union for assistance in the development of laws based on the UPOV Convention.

2.1.10 International Treaty on Plant Genetic Resources for Food and Agriculture

Zambia is a party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) that entered into force on 29th June 2004. The Treaty provides a legal framework recognizing the need for conservation and sustainable use of plant genetic resources for food and agriculture and a regime for access and benefit sharing. The Global Plan of Action on conservation and sustainable use of plant genetic resources is an important component of the Treaty. All contracting parties to the Treaty, including Zambia, cooperate during periodic reassessment at the UN Food and Agriculture Organisation (FAO) of the state of the world's plant genetic resources for food and Agriculture. The ITPGR respects farmers rights to save, use and propagate farm saved material whilst Zambian national seed laws are aligned to the COMESA and SADC seed protocols, the key problem is that COMESA, SADC and national laws in Zambia are based on UPOV and not on ITPGR, which would be a fundamentally alternative model.

2.2 Social economic implications

Fewer than 40 percent of small to medium-scale maize farmers worldwide use hybrid seed (World Bank, 2012), however, in Zambia, the proportion has increased to around 90% due to continued expansion of the Farmer Input Support Program (FISP). It is likely that the share of small and medium farmers using hybrid seed has increased more recently, but it is still clear that many households do not have regular access to this input. Combining FISP with the imposition of UPOV on an agricultural landscape where the huge majority of smallholder farmers jointly use their own, informal seed systems together with the recycling of certified seed poses fundamental problems. Recycling of seed is a common practice among smallholder farmers, but recycling of commercial first generation hybrid seed leads to dramatic declines in yield in the subsequent years of use, in contrast to the local OPV seed which can be recycled but without any significant indication of decline in yield potential. UPOV based laws would furthermore criminalize these approaches of recycling.

Socially, these seed laws and regulations remove ownership and participation of the small scale farmers as it restricts their full participation by bringing out stringent conditions and obligations which small-scale farmers are unable to meet. Consequently, it is important to note that the seed laws and regulation are meant to protect and give an advantage to the formal seed sector which includes the seed companies. According to (ACBIO: 2017), formal breeding has historically focused attention on increasing yields (productivity). This is obviously important to all stakeholders, including farmers. However there are also trades-offs in adopting formal breeding:

- Formal breeding tends to focus on relatively few crops and to direct activities towards favored, high-potential areas, with little, if any, work on diverse demand in more marginal areas.

- The formal breeding system is not very responsive to issues beyond yield, with unintended consequences that ripple out into seed systems. Other traits and qualities, including appearance, conservation, processing, and culinary value are marginalized or even traded off for yield.

- Varieties that may perform well at research stations ('on-station'), under ideal conditions, with fertilizers, irrigation and so on, are not necessarily good in relation to specific and unique socio-ecological contexts, especially marginal areas. The seed sector in Zambia is governed by a number of institutions functioning under the Ministry of Agriculture including the Zambia Agricultural Research department and the Seed Control and Certification Institution (SCCI). The Zambia Agricultural Research department in the country has ten research stations with Mount Makulu Central Research Station functioning as the headquarters. The institute's main objectives are to develop and adapt crop, soil, and plant protection technologies, and to provide high-quality, appropriate, and cost-effective services to farmers. The research facility at Mount Makulu is one of Zambia's only two fully-equipped agricultural laboratories capable of detailed soil analysis and other agricultural testing.

Given the above stated scenario, it is clear that the private sector players are meant to benefit more in the current dispensation. The ones who participate more within the sector have more influence and power. Smallholder farmers are rarely called to the table to participate.

However, the private sector also faces some hindrances. If a company wants to introduce a new variety of seed in Zambia, it can still take up to two years to obtain official approval. The other issue of current concern to representatives of the private sector is the presence of what they call "counterfeit seed" in the market. Counterfeit seed is 'seed' sold under false labels. The Zambia Seed Traders Association (ZSTA) is collaborating with SCCI to better monitor the seed trade. In Zambia, an estimated two-thirds of the maize area is planted with certified hybrid seed. Private seed companies confirmed this trend, attributing it mainly to FISP. There are also regional variations; Central and Lusaka Province have much higher adoption rates, for example, than Luapula and Eastern Provinces, which are still lagging (World Bank2012).

Neoliberal reforms in the early 1990s tried to attract FDI in agriculture. The privatisation of parastatals led to a roll back of the state and private sector taking a leading role. Currently, the government's emphasis on agriculture is based on the second National Agriculture Policy (2016–2020), which aims at having an "efficient, competitive and sustainable agricultural sector". There were different views amongst respondents[2] about the impact of the policy. While some private firms admit that the policy environment can be unpredictable when there is a change in government, most stakeholders still consider that government could do a better job of listening and taking into account the considerations of all stakeholders, including the concerns of farmers. With regard to the seed and fertilizer sectors, the FISP input subsidies and Food Reserve Agency maize marketing policies continue to have a distorting impact.

2.3 Political implications

Zambia's agriculture has a special place in the country's political and economic agenda. However, Seed occupies a central position in Zambia's agricultural political economy as the basis for national food sovereignty. The political importance of seed can be traced back to the earlier colonial period where seed, especially maize, has always been at the centre of Zambian agricultural policies, with price subsidies being the hallmarks of the country's policy approach. Currently, maize seed and other inputs are heavily subsidised and absorb over 50% of the agricultural budget, a situation that has shifted funding from other key agricultural growth drivers such as farmer education and extension, research and development, and infrastructure development. As a result of the deeply political nature of agriculture in general, especially maize in Zambia, and the extensive private sector has tended to take a cautious approach to investing in the maize seed sector. In addition, seed has been highly politicized in Zambia and overshadowed by corruption.

Zambia as a country has a positive political will to develop the agriculture sector where the seed sector is embedded. However, the political will does not transcribe into action as exemplified by the expression on paper to have a strong and elaborate plan of implementation in agriculture but no such plan exists. Also, currently the seed policy which is supposed to be the instrument that government uses to regulate the sector, has been in draft form since 1999, a situation which brings doubt on the political will. This entangled with corruption and dominance by a limited number of seed companies, negatively affects the democratic and transparency of whole seed sector.

2 *Focus Group discussions Participants in Mumbwa, Rufunsa and Chisamba.*

2.4 Corporate interest in the seed sector in Zambia

A number of international seed companies have shown interest in investing in the country, among them are companies such as PRASAD seeds from India , and Monsanto from America and these are actively supported by their governments e.g. through diplomacy and rural development projects. These companies then provide incentives to farmers it is these incentives given to farmers that makes the farmers to build trust in the companies and forget about protecting their own seed systems. The government of the republic of Zambia on the other hand has the obligation of protecting the national public interests, therefore they need to fully understand the provisions within UPOV before they become a member of UPOV, which requires stringent restrictions for farmer use of seed varieties. The multinational companies cohere with African countries to sign agreements based on UPOV and ARIPO standards that have conditions of revising the seed laws to force small scale farmers to buy seeds and fertilizers from the corporate rather than seed sharing, which has been practiced for generations and ensures biodiversity.

3. Perceptions of stakeholders

3.1 Political and regulatory framework for seed system in Zambia

Seed companies and dealers that were interviewed included those from MRI, Monsanto, Klein Karoo, Afriseed, Kamano, Zambezi seed, Farmers Barn, and Syngenta. All respondents were aware of the existence of COMESA and SADC regional seed laws and regulations. The respondents believed that the COMESA and SADC laws and regulations were being fully implemented in the region. The study found that the respondents from government institutions, that is, Seed Control and Certification Institution (SCCI), Ministry of Agriculture and Mount Makulu Research Institute acknowledged the existence of regional seed laws and regulations, but however stated that these were not being fully implemented in the country as yet. In addition, it was indicated that the SADC member countries resolved that the varieties of seeds should be released to complete the agreement. Two thirds of countries were required to meet in 2013 to change the seed laws. However, this has not yet happened to date.

3.1.1 National Seed Laws and Regulations in Zambia

The study found that respondents from all the seed companies that were interviewed are aware of the existence of the National Seed laws and regulations in Zambia which fall under the Ministry of Agriculture. Seven out of eight of the seed companies that responded indicated that they had read the draft National Seed Policy of Zambia of 1999. It was also mentioned that the non-enactment of the policy has an impact on the seed sector. At national level there is no data base where you can freely access information about the activities in the seed sector. It was also outlined by some private sector representatives that the focus on Zambia's dependence on maize has also skewed the whole sector to be maize centric influencing all political decisions towards the maize crop at the expense of other crops that could do well.

3.1.2 Seed Control and Certificate Institute (SCCI)

The existence of the SCCI, its role as a regulatory institution, is clearly understood and appreciated by not only government, but other stakeholders in the seed industry. The SCCI was also recognized by the majority of respondents, as having enough capacity and infrastructure to conduct timely registrations, testing, issuing approval for both domestic and imported seed. However, it was noted, after speaking to Government and NGOs that due to insufficient funding to both the SCCI and the research institutions have moved the focus of research from farmer centered to donor centered. This also has contributed to the takeover of the seed sector by the rich multinational corporations.

3.1.3 Seed Policy

30% of the respondents stated that a national seed policy exists that regulates the seed sector. However, the seed policy is not in place. This finding therefore shows a gap in understanding the difference between a policy and an act. This poses a challenge in regulating the operations of the seed sector players.

Further, the seed act supports private sector participation in research in seed systems in Zambia. This also means that government is open to allow the private sector players to get involved. This is problematic as it allows the influx of foreign based seed companies in the country at the expense of domestic companies. In addition, government does not subsidize the private sector to undertake research or any other activity in seed production as a result most research agenda are pushed by the MNC.

3.1.4 Participation in policy processes

Consultation and participation of different stakeholders in any policy formulation process is critical if ownership and inclusiveness is to be achieved and reflected in these documents. For the seed industry, it is also important that the policy reflects the different needs of the different stakeholders, such as the seed companies, farmers, commercial and small seed breeders, research and academic institutions, as well as the general public. Seven out of eight of the respondents from the seed companies indicated that they were not consulted in the formulation of the Seed Act, and thus felt that the policy did not adequately cover their interests and concerns. However, response from government representatives stated that it tries to consult stakeholders on seed issues and regulations often and when need arises, but they did not provide any evidence of consultations. From this finding, it seems likely that the process of policy formulation is not going through a consistent consultation large constituency of smallholder farmers, but there is a high possibility that individual voices from the corporate sector get privileged access to decision makers.

One function of the SCCI is to make sure that seed production adheres to the stipulated guidelines. However, 75% of respondents indicated that the institution does not adequately intervene in seed production done by the private sector, especially in respect of the multinational seed breeders. 25% stated that government did intervene by monitoring fields, certifying seed for local use and export purposes, and also through capacity building.

On consultations with other stakeholders apart from government, the private seed sector players indicated that they consulted farmers and the general farming communities, however this was refuted by the respondents in the focus group discussions with farmers. All the stakeholders interviewed felt that consultation was critical for transparency and accountability by all involved. It was also stated that issues to do with quality assurance and continuous improvement were critical for all seed users, hence the need to have an inclusive participatory process. Further, as part of their social responsibility, some seed companies indicated that they carried out sensitization on what varieties to grow, donated inputs to vulnerable farmers, set up out grower's schemes, and also provided extension services.

All seed companies interviewed indicated that they conducted trials on demo plots which belonged to farmers and participating farmers were given free seed for letting the seed company use part of their farm land to promote seed varieties. Further, not all seed companies indicated how much money was ploughed back into the communities as social corporate responsibility.

3.1.5 Socioeconomic dynamics of seed system in Zambia

From time immemorial, seed has always played a critical role among farming communities. Women were said to be the custodians of seed and the seed was a communal asset. Seed was ascribed to women as it played an important role in achieving food security and poverty reduction at the household level. Farmer-managed seed systems were based on informal seed sharing among farmers and this ensured diversity and continuous production and preservation of certain varieties. In this respect, traditional seed was stored, exchanged, and used for a long period. The formal seed sector, participation is mainly based on resources and gender parity is not considered. In the informal sector women play a critical role as they are the traditional custodians of seed and household food security. Respondents in the FGD also affirmed to the fact that seed is considered to contribute to nutrition security as well as the wellbeing of household members.

When farmer representatives were asked about what they felt about using traditional seed, all the respondents indicated that not much was being done to promote the use of traditional seed. As a result, this has created a favorable environment for the private sector to monopolize the seed sector, thus removing the social attachment that the farmers already have to their own traditional seed.

3.1.6 Government and private sector involvement in seed systems

Certified seed is mainly multiplied by research institutions and private seed breeding companies. As such, most respondents stated that government is indeed involved in seed multiplication. However, it was not clear as to how much private sector is involved, given that they were reluctant to state the depth of involvement.

Government institutions play an important role in the seed system and therefore their performance and delivery of service can define the success or failure of the seed system. Findings from the study indicated a mixed view on how effective government institutions were in the seed production process. Some respondents from the private sector felt that government was doing well and had integrated the private sector well, to ensure that seed production was enhanced and to provide the necessary services such as certification. One of the challenges noted by respondents from the private sector which affected private sector participation, was the erratic funding and unstable government performance.

The farmers in the study view ,seed companies from private institutions as being very effective in the seed production chain by providing seed to farmers. Private sector is driven by profit and thus with a seed market that is competitive, private companies are forced to be efficient and effective in providing seed on the market. In support of this, 50% of the respondents from the seed companies indicated that they provided quality seed to small scale farmers. However, the challenge is the availability of a diverse variety of seed for different crops as most of the privately owned seed companies tended to focus more on a few commercial crops such as Maize and soya beans, however government feels the private sector needs to fully explore the other crops as well.

The respondents from all groups also indicated that there are two important government programmes that buy seed from seed companies for distribution to small-scale farmers for crop production. The Fertilizer Input Support Programme (FISP) of the Ministry of Agriculture accounted for about 35% of the total maize seed estimated to have been planted in the country over the 2015/2016 season. The government also provides a guaranteed market for mostly maize produce through the Food Reserve Agency (FRA). Of all the government agricultural sector programmes, the FISP and FRA programmes account for almost half in terms of budget allocation to the agricultural sector. It is on these government programmes that national seed companies depend on for their survival since they face a lot of competition from international seed companies that are involved in the breeding of their own varieties, and which have a well-structured production and marketing base.

3.1.7 Socio economic and political influence

The Ministry of Agriculture and Livestock, Mount Makulu Research Institute and the Seed Control and Certification Institute (SCCI) are among the key government actors in the seed system in Zambia. While Zamseed, Pannar, Monsanto, MRI/Syngenta and SeedCo are among the key private sector seed companies which are very active with smaller ones like Kamano and Zambezi seeds being active but with less influence. Agro-dealers, Cooperatives and farmers groups also play a vital role in the seed system in Zambia. Among the different actors, their influence is varied but it transpired that most privately-owned MNC shed more influence and they had more access to the policy makers, unlike the smaller seed companies that were not given much attention and their voices were hardly heard. This creates a situation where the bigger companies develop more power and control most of the decisions.

Zambian Private Seed companies mainly focus on a mix of maize, cereals, legumes and vegetable seeds while international companies focus on hybrid maize. The findings of this research are similar to those of the USAID Country Report (2016), which found that the five most influential private seed companies in Zambia include Zamseed, Kamano, Pannar, Monsanto, MRI/Syngenta and SeedCo. The table below is a summary of the key private seed companies which are more active than others in Zambian Seed Sector.

Table 3: Most influential seed companies in Zambia

NAME OF COMPANY	SEED FOCUS	ESTIMATED MARKET SHARE (%)	MAIN ACTIVITIES
Seed Co	Maize	38	Production and Processing of Seed
MRI/Syngenta	Maize	27	Production and breeding site for maize
Pannar	Maize, Soybean	15	Production of Seed
Zamseed	Maize, Legumes, Vegetables	9	Production of Seed
Kamano	Small grain, Cereals, Legumes, Maize	1	Processing plant for Seed
Monsanto	Maize	1	Production of Seed

Source: USAID Country Report, 2016; Research Team Analysis, 2018.

Table 3 shows the seed focus, estimated market share, and main activities of the five most influential private seed companies in Zambia as of 2016, and the ranking seems to have remained stable as of 2018. These five key influential private seed companies includes Seed Co as the leading seed company in Zambia, followed by MRI/Syngenta, Pannar, Zamseed, Kamano and Monsanto. Other companies which are indigenous like Zambezi Ranching and Cropping do not have any significant stake in the seed sector.

Zamseed is/was? The first seed company in the country established in the early 1980s, privatised from having been a parastatal in the early 1990s, it has production capabilities and its country of origin is Zambia. Kamano is originally Zambian, it has a processing plant and does tool processing for other small companies. Pannar is originally a South African company now owned by Pioneer, a company from the United States of America (USA). Like Panner, Monsanto is, operates as a production base for other Monsanto Africa companies. MRI/Syngenta is originally from China, it operates as a major breeding site for maize and production export to other Syngenta companies. Seed Co is originally from Zimbabwe, and is the leading seed company in Zambia because it has state of the art production and processing facilities for export to other Seed Co companies (USAID Country Report, 2016). The study also found that the indigenous seed companies were being bought by the more powerful multinational companies. This can be a way of removing the power from the locals and situate it in the multinationals as form of control.

Cooperatives also play key role in the seed system in Zambia. As of 2016, the Ministry of Agriculture and Livestock estimated that the numbers of agricultural cooperatives in Zambia have as many as 3.5 million members. The main activities of these agricultural cooperatives is to help members access subsidized inputs and mobilize crop marketing through their respective depots and collection points. Findings of the focal group discussions in Chibombo, Mumbwa, Rufunsa, and Chongwe are similar to those of the USAID Country Report (2016) which found that farmers' groups are common in Zambia, but they are not well coordinated. This is because there is limited information exchange among the multiple community-based out growers and seed producers and the cooperatives.

Agro-dealers are also vital in the seed system in Zambia. Agro-dealers fall into two main groups. One group of agro-dealers is located in commercial centers along the line of rail and highways while the other group is rural-based agro-dealers that are often small enterprises. Both groups focus their activities on maize and vegetable seed. During focal group discussions in Chibombo, Mumbwa, Rufunsa and Chongwe, it was found that smallholder farmers complained of the seed being sold by these agro-dealers to be very costly. The study also found that the farmers have limited access to information on seed, evidenced by the fact that the majority of the farmers said that they have never heard of nor seen and read the Zambia National Seed Policy under the Ministry of Agriculture and Livestock. The farmers also complained of having limited access on improved varieties of seed other than maize, as the agro-dealers mainly focus on selling maize seed. Hence, smallholder farmers end up obtaining their seed through informal means of saving traditional or indigenous seed and trading with neighboring farming communities. They also lack mobilization among themselves as well as from local leadership. It was also discovered that there is no adequate information available to the farmers, thereby causing the farmers to rely on speculative information. The current system is segregative and not inclusive. Most farmers interviewed indicated that they solely relied on the seed companies that provided information with government extension staff not having control or any form of influence over the seed companies.

The findings from the focus group discussions indicate that the formal seed sector in Zambia is highly segmented and influence comes from a small number of powerful multinational seed companies such as Monsanto, Pannar, MRI and Seed co. Over 90% of the farmers interviewed indicated that they had used either one or all seeds produced by these companies but there is low publicity given to the use of own traditional seeds. However, respondents amongst farmers explained that they still have faith in their traditional seeds, and they felt that it is important to preserve the traditional varieties and use the hybrid seed for short term solutions such as food security. It appears that many farmers have a dualistic system which depends on both traditional and commercial seed varieties. It was also outlined that despite this reality government programmes such as the FISP distributed seed only from the private seed companies. This actually shows the level of influence that private sector has on the Government of Zambia.

Farmers pointed out that the bought the seeds available on the market, and the larger seed companies monopolized the market in terms of availability of choice of varieties. Further, it was clearly pointed out that marketing of seed by the companies was done during field days, exhibition days, and during the agricultural shows. At such events, it is clear that the more powerful and adequately funded companies would overshadow the less funded companies in terms of influence. This shows that the playing field is not level and seed companies participate depending on their resources. Smaller companies were evidently pushed out of the market due to competition.

The level of transparency among the seed sector players is awfully poor. Seven out of eight of the Private seed companies that were selected to participate in this study were unwilling to disclose the companies' operational status: who funds them, their workforce and production levels, which indicates the limited transparency of information that is not available in the public domain. This stance by the private companies raises key questions about the positive impact of the companies in the country.

3.1.8 Socioeconomic dynamics of seed system in Zambia

Seed companies are constrained by stiff competition, high cost of production, high freight charges, and fluctuations in the Zambian Kwacha against the US Dollar. The national and local private seed sectors are spending much of their resources in the competitive hybrid maize market, owing to FISP, at the expense of developing other markets of legumes for which they could be well positioned. The national seed sector is dependent on FISP for marketing, and is highly dependent on public research for access to improved seed varieties. Contractual enforcement is weak, resulting in the illegal purchase by unregistered buyers of financed crops through the out grower schemes.

3.1.9 Use of traditional / indigenous seed in Zambia

Respondents were asked to give their views about indigenous seed and seed sharing at a community level among the farmers. Some respondents from seed companies argued that there is too much indigenous seed, and that seed sharing at community level among the farmers contributes to producing low yields. As a result, it cannot sustain the food needs of the smallholder farmers throughout the year, thereby leaving them trapped in the vicious cycle of poverty as a result of sharing and planting indigenous seed. It is interesting to note that views from the private sector on informal seeds were quite diverse. A respondent from Monsanto was of the view that farmers need to be buying and planting only certified seed and not sharing indigenous seed. Other respondents indicated that indigenous seed should work side by side with certified seed. In addition, other respondents from the seed companies were of the view that indigenous seed and seed sharing among the farmers at community level should be encouraged for the sake of farmers who cannot afford to buy certified seed. Further, it was stressed by one respondent that indigenous seed should be promoted and that the sharing of indigenous seed is good, but there is need as well to consider the quality of the seed being exchanged. Additionally, respondents from government felt that farmers should be allowed to share and exchange seed, however, this was contradicted by their promotion of the growing and consumption of hybrid certified seed exclusively.

From the findings, what is clear is that although local varieties yield less than improved varieties, they may be better suited to the local diverse and specific low-input agricultural conditions. Local varieties are also a source of seed security in case the improved varieties fail for example in times of erratic rainfall; local varieties have been known to still produce whilst some improved varieties fail to cope. Yet the farmer-saved seed sector continues to decline as new and improved varieties, particularly hybrid maize, continue to roll out in the formal sector, through FISP and FSP, to the extent that the conservation and use of local varieties, maintenance, and seed production of those crops is threatened. All the above challenges create an opportunity for improvements in the seed industry to be addressed.

4. Conclusion and recommendations

The seed sector in Zambia, compared with other countries in Sub-Saharan Africa, is characterized by the presence of both national and international seed companies that target national markets and export primarily hybrid maize seed. This private seed sector is supported by an enabling environment in which the Seed Control and Certification Institute (SCCI), a government organization that is responsible for seed quality management, certification, and other regulatory duties, acts as a catalyst within this enabling environment. The Zambian seed sector is further characterized by the intense promotion of hybrid maize seed that is distributed at subsidized rates to small-scale farmers within the Fertilizer Input Support Programme (FISP) of the Ministry of Agriculture and Livestock.

Further, Maize cultivation is promoted by the Food Reserve Agency (FRA), which buys maize production country-wide at a guaranteed price set by the government. The basis for these policies is that they result in national food security, according to government officials. However, informal seed systems, with both farm-saved and community-based seed systems, are dominant for all other important food crops. Nonetheless, the focus on maize reduces farmers' interests in cultivating other crops and in local seed varieties. This crop replacement results in dependency on one crop, creating vulnerability in times of drought or disease to that species

4.1 Recommendations

- There is a need to establish a link between the formal and informal seed systems where both private seed enterprises and public institutions have to play an active role. In order to ensure that the research generated from the enterprises are responding to the farmers' needs, Government should consider regaining control of these enterprises. Government could for example through a majority of shares in the enterprises. These enterprises should be structured in a way that farmers can participate, encourage seed diversity, food and nutrition security as well as reduce monopoly by multinationals. This is key in developing seeds based on the diverse conditions and needs of smallholder farmers, reducing poverty and creating employment, which according to the findings is not being realized within the seed sector.

- There is need for government to provide incentives to local and indigenous seed companies that wish to venture into the seed sector so that farmers participate in the seed sector and enhance indigenous crop diversity for food security.

- There is also need to include civil society organizations, farmer organizations, and the private sector at the same level, in the formulation of seed laws and regulations. As the study has shown, private seed companies have significantly better options to articulate their voices and interests in policy processes as well as to fund their cause over a wider geographic spread.

- As noted earlier in this paper, 87% of the private seed companies were not willing to give out information. As such, there is need for government to take deliberate steps such as putting in place mechanisms that ensure that there is transparency in all business operations in the seed sector to enhance the upholding accountability and social responsibilities. There is an urgent need for a seed policy that takes into account the needs of farmers and protection of seed rights. The position of this paper is that there are no clear guidelines and systems in place to regulate the seed sector. . There is an urgent need for a seed policy to be enacted in order to regulate the seed sector. A participatory approach in the finalization of the policy will assist in defining and harmonizing participation of the formal and informal seed sectors. Inclusion of clear guidelines that stipulate social, economic and political decisions.

- Government needs to invest more in the creation of markets of diverse crops which may perform better than maize, such as small grains like millet and sorghum, and traditional vegetables, as such there is need for a deliberate policy for other crops that are at the verge of extinction.

- There is need for further research to establish the effectiveness of government in regulating and monitoring the seed sector. This is important as it will bring out gaps and recommendations that will enhance the development of the formal and informal seed sector in Zambia.

Focus group discussion - Source: Wilfred Miga

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Appendix - List of interviewees held between December 2017 and February 2018

A. FOCUS GROUP DISCUSSION GROUPS

- Mumbwa - Kapyanga village 10 participants
- Chongwe - Kayongoloka village 10 Participants
- Chibombo - Makusa B, Nanswisa agriculture camp 11 participants
- Rufunsa - Chimusanya central, 22 participants

B. SEED COMPANIES - PRIVATE INSTITUTIONS

- MRI
- Monsanto,
- Kamano,
- Klein Karoo,
- Farmers Barn,
- Afriseed
- Syngenta
- Zambezi Seed

C. GOVERNMENT INSTITUTIONS

- Seed Control and Certification Institution
- Mount Makulu Research Institute
- SADC Gene bank, Lusaka

D. CIVIL SOCIETY ORGANIZATION

- Community Technology Development Trust
- Zambia Alliance for Biodiversity and Agro ecology
- Environment Africa

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