Grain Marketing Innovations and Investments in Zambia: Creating Marketing Opportunities for Smallholder Farmers

by

Brian Chisanga and Antony Chapoto

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Indaba Agricultural Policy Research Institute (IAPRI)

Lusaka, Zambia
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The Indaba Agricultural Policy Research Institute is a non-profit company limited by guarantee and collaboratively works with public and private stakeholders. IAPRI exists to carry out agricultural policy research and outreach, serving the agricultural sector in Zambia so as to contribute to sustainable pro-poor agricultural development.

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Any views expressed or remaining errors are solely the responsibility of the authors.

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EXECUTIVE SUMMARY

Zambia’s grain marketing has undergone dynamic transformations spurred by massive investments in grain infrastructure led by the private sector. This influx of private sector capital corresponds with the period that Zambia has become a surplus producer of key commodities such as maize, soya beans, and wheat. With the increased investments in grain marketing, various innovations have emerged, with potential to address the grain marketing constraints of small scale farmers and foster the inclusiveness of poor and marginalized households into the market. These include various financing models such as contract farming, forward contracting, credit, Information Communication Technology (ICTs), private sector extension services, weather index insurance, and Warehouse Receipt Systems (WRS).

While growth in the private sector investments in grain markets is evident, it has endured marketing and trade policy changes which stifle further growth. Investments in grain storage and marketing infrastructure requires a stable marketing environment. Hence, failure by the government to provide supportive policies to private sector investments and innovations affects private sector growth, while farmers lose marketing opportunities. This study, therefore, sought to profile the developments in grain marketing innovation that have taken place and whether smallholder farmers are positioned to benefit.

The main source for data for the study was key informant interviews with large grain traders and other key institutions that provide support services. In addition, a total of eight Focused Group Discussions were conducted with smallholder farmers in Eastern and Central Provinces. To complement the insights from the qualitative analysis, the 2015 Rural Agricultural Livelihood’s Survey (RALS) was used to estimate descriptive statistics for smallholder marketing channels for key grain in Zambia.

Study Findings

1) Increased investments in Zambia’s grain markets, have brought about a number of innovations by large grain traders. The innovations include: creation of more structured markets for grains, credit financing for smallholders, ICTs for smallholder farmers, private sector extension services and skills transfer, weather insurance, and the Warehouse Receipt Systems.

2) Innovations are mainly driven by large grain traders who are mostly multinational corporations including AFGRI Corporation, NWK Agri Services and Cargill. There is more awareness and access to grain market innovations in areas with high presence of large grain traders –an indication that large grain traders are the main drivers of these marketing innovations.

3) The investments and innovations are mostly happening in surplus maize and soya beans producing areas of Central, Eastern, and Southern Provinces.

4) Larger farmers where to a larger extent benefiting from these innovations as they were able to produce a surplus enabling them to interface with the market. As expected, these farmers were more commercialized and had more assets and social capital.

5) The main benefit accruing to smallholder farmers was centred on the creation of structured markets through pre-financing and forward contracts. The structured markets enabled farmers to have access to a ready market for their crops, credit and extension. Others, had access to storage facilities and other risk mitigation instruments such as weather index insurance. In turn these benefits were attributed to improved productivity, sales and income for smallholder farmers.
6) Smallholder farmers face a number of challenges associated with grain market innovations including:
   a. low output prices, especially that outgrowers sign an agreement compelling them to repay their loans soon after harvest when prices are too low; and
   b. limited understanding for some of the innovations. For example, farmers indicated that they did not understand how weather index insurance worked, which affected their demand for it.

7) For the grain traders, they indicated that their main constraint affecting their operations was policy inconsistency mainly due to ad-hoc trade restrictions and FRA inconsistent purchases and sales resulting in price volatility and often times results in high cost of doing business.

**Recommendations**

1) Government should foster effective private sector market development through predictable and stable policies. ZAMACE would help bring sanity to the market if it can be capitalized. The FRA as a big public player should take the lead and help hasten capitalize ZAMACE by utilizing the platform to manage the strategic reserves.

2) There is need to moderate price volatility through a well-managed trade regime. Ad-hoc export bans work against private sector innovations and investments and curtail benefits to smallholder farmers. Government policies should be transparent and predictable in order to encourage private sector participation.

3) Cooperatives if properly organized and managed could provide a major link with grain traders and can be a useful vehicle to reach more farmers with grain market innovations. Farmer cooperatives and farmer organisations could provide aggregation services thereby helping smallholder farmers with more bargaining poor and reducing the cost of doing business for the grain market innovators.

4) There is need to enhance a pluralistic approach to extension service delivery to enhance farmer productivity as well as help develop the capacity of farmers to think of farming as a business.

5) There is need to enhance awareness and implementation of the ZAMACE’s warehouse Receipt System and a price recovery system among farmers countrywide.
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<td>Crop Forecast Survey</td>
</tr>
<tr>
<td>FRA</td>
<td>Food Reserve Agency</td>
</tr>
<tr>
<td>GTAZ</td>
<td>Grain Traders Association of Zambia</td>
</tr>
<tr>
<td>ICTs</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>MT</td>
<td>Metric Tons</td>
</tr>
<tr>
<td>Natsave</td>
<td>National Savings and Credit Bank</td>
</tr>
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<td>VFM</td>
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<td>ZAMACE</td>
<td>Zambia Agricultural Commodity Exchange</td>
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<td>ZNFU</td>
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1. INTRODUCTION

Zambia’s grain marketing has undergone dynamic transformations spurred by massive investments in grain infrastructure led by the private sector. The influx of private sector capital corresponds with the period that Zambia has become a surplus producer of key commodities such as maize, soya beans, and wheat. Large grain traders, including multinational firms, whose influence was hardly noticeable before 2002, now play a major role in grain trading. Large grain traders are driving major transformations in grain marketing, also referred to as an evolution in the middle. Yet these transformations have not received enough attention in literature and even in policy discussions (Sitko, Jayne, and Burke 2017).

Growth of the large grain traders’ influence in Zambia is quite evident. Private sector grain storage capacity has increased from 550,000 Metric Tons (MT) in 2013 to more than 800,000 MT in 2016 with the total value of investments growing from about US$ 34 Million to $80 Million over the same period (GTAZ 2013; GTAZ 2017). Between 2011/12 and 2014/15, maize sales by smallholder farmers to large-scale private traders in Zambia increased nearly five-fold, from 40,617 to 241,071 MT. This represents an increase from 3% of total smallholder sales by volume to 12% that were sold to large-scale traders (Sitko and Chisanga 2016). In the 2016/17 agricultural marketing season, large grain traders accounted for over 40% of the purchases of total maize and soya beans marketable surplus (GTAZ 2016; MoA and CSO 2016).

With the increased investments in grain marketing, various innovations have emerged and have the potential to address some of the grain marketing constraints facing smallholder farmers in Zambia. These include various financing models such as contract farming, forward contracting, credit, Information Communication Technologies (ICTs), private sector extension services, weather index insurance and Warehouse Receipt Systems (WRS) (Box While the private actors are innovating to realize commercial objectives, their investments are also helping create structured markets for smallholder farmers with the potential of closing the marketing gap in rural Zambia. However, in cases where there is imperfect information, some farmers might participate in ways that leave them more vulnerable to unfair contracts and manipulation (Mendoza and Thelen 2008).

Public sector-led grain marketing through strategic grain reserves such as the Food Reserve Agency (FRA) and private sector-led grain marketing complement each other in providing credible markets for smallholder farmers. However, failure by the government to provide supportive policies to private sector investments and innovations affects private sector growth, while farmers would lose marketing opportunities. The scale and operations of the public sector and trade policies have a big bearing on the performance of the private sector.

This paper sought to profile the developments in grain marketing innovation that have taken place over the past decade and explore whether smallholder farmers are positioned to benefit from those innovations and investments that have occurred in Zambia. The specific objectives were as follows:

a. To profile grain market investments and innovations in Zambia;

b. To determine the type of farmers who benefit from these grain market innovations; and

c. To make recommendations on how the emerging grain market innovation count benefit smallholder farmers.
This research is key, as it will provide evidence that informs the policy debate on the potential role of the private sector as the main driver of agricultural development and trade in Zambia. According to the Second National Agricultural Policy, private sector plays a central role in enhancing market access, productivity, technology adoption and access to credit. Furthermore, identification of scalable best practices in grain market innovations by the private sector would benefit the country, because public resources currently devoted to the grain sector through FISP and FRA could be channeled to other key drivers of agricultural growth receiving limited public resources.

Following this introduction, the rest of the paper is organized as follows: Section 2 discusses the data and methods used for the study; Section 3 presents the study findings. The conclusions and recommendations are presented in Section 4.
2. A FRAMEWORK FOR UNDERSTANDING GRAIN MARKET INNOVATIONS

Public sector investments in grain markets primary seek to correct market failures as well as achieve social objectives, while private sector investments are driven by profits. If well-coordinated, the two should complement each other. However, in most developing countries including Zambia, the public sector often overshadow private sector activities resulting in less efficient markets. Grain market innovations emerge as new ways of doing things as investments by the public and/or private sector increase.

The innovations in the grain sector (hereafter referred to as grain market innovations) can be understood through the lenses of institutional innovations, which can be described as new rules and forms of interactions. They help redefine sustainable practices locally and bring together actors in food systems who have not traditionally worked together (Loconto, Poisot, and Santacoloma 2016). Institutional innovations in this regard are increasingly creating new forms of interactions in rural markets including private driven innovations and investments.

Grain market innovations have emerged in the context of other transformations in agriculture including urbanization and rapid population growth which have increased demand and necessitated investments in grain wholesaling in the country. It has also been noted that high global food prices and grain export opportunities have been major catalysts for the rise in grain trading activities in Zambia. The consolidation of smallholder land size and the rise of the emergent farmers is also linked to the growth of large scale traders. Survey data shows that sales to large-scale traders by smallholders are skewed toward larger land holders (Sitko, Jayne, and Burke 2017; Sitko and Chisanga 2016). With the entry and expansion of large grain traders’ there have been a number of innovations governing the relationship between grain traders and farmers. The private sector has been the nucleus for the unprecedented rise in grain market innovations in Zambia and often has been disrupted by frequent ad-hoc and inconsistent market intervention through FRA purchases and sales as well as unpredictable trade policies.

Two basic principles define innovation system theory, namely, that innovation is context specific, and that innovation occurs within an interacting system of diverse actors, where value chains are a particularly important organizational form (Larsen, Kim, and Theus 2009). The private sector in sub Sahara Africa increasingly drives innovation, although the public sector and Non-Governmental Organizations support innovation through research on public goods, whereby market conditions, policies, and institutional arrangements provide the incentives and the competitive pressures to drive private sector investment (Larsen, Kim, and Theus 2009).

Three criteria have been used to construct a basic framework for thinking about market inclusivity: the extent to which they reach or serve the poor, generate a positive development impact and work in the direction of achieving financial viability (defined here as, at least, breaking even) (Mendoza and Thelen 2008). Market innovations that increase profitability for the private sector and provide markets, thereby increasing income for smallholder farmers, creates a business case for greater investments on one hand and the growth of the smallholder farmers on the other hand. Essentially, private sector initiatives can increase access to markets, which could contribute to economic empowerment thereby leading to rural development. If the relationship is mutually reinforcing, there is a natural movement away from spot markets into transactions that lower costs and thus increase farm-gate prices. Through contractual arrangements with grain traders, smallholders are able to access credit for their input requirements and a range of productivity enhancing services such as extension services (Poulton, Kydd, and Dorward 2006; Reardon and Timmer 2012; Barrett 2008).
3. DATA AND METHODS

A mixed methods approach was used in the study, which included both qualitative and quantitative analysis. Qualitative methods involved key informant interviews, with large grain traders (including NWK Agri-Services and Afgri Corporation), the Zambia National Farmers Union (ZNFU), the Zambia Agricultural Commodity Exchange (ZAMACE) and Mayfair Insurance. Using semi-structured interviews, the study sought to:

i. profile the innovation that have emerged over the years;
ii. assess the main drivers of the innovations and benefits accruing to their business and types of farmers targeted; and
iii. assess how smallholder farmers were benefiting from the market innovations.

A total of eight (8) FDGs composed of ten participants each were conducted with smallholder farmers in Eastern and Central Province. In Eastern Province, FDGs were held in Chipata (2) and Petauke (2), whilst in Central the FDGs were conducted in Kabwe (2) and Kapiri-Mposhi (2). In each district, we covered an area actively serviced by large grain traders as well as one with limited or modest presence of the traders. The discussions captured: a) farmers’ perceptions and experiences about the different grain market innovations; and b) the benefits and/or costs of the innovations on their livelihood in terms of income, market and credit access, productivity, and technology adoption.

To complement the insights from the qualitative analysis, the 2015 Rural Agricultural Livelihoods Survey (RALS) was used to estimate descriptive statistics for smallholder grain marketing channels in Zambia. The RALS is a nationally representative survey of 7,934 households conducted by IAPRI in collaboration with the Ministry of Agriculture and Central Statistical Office. The data is used to analyze smallholder maize and soya beans sales to large grain traders and other outgrowers, access to credit and private sector extension, and use of ICTs. In order to determine the type of farmers that benefit from these grain market innovations, the characteristics of farmers selling maize and soya beans through large grain traders and out growers were compared to those selling through other channels.
4. STUDY FINDINGS

4.1. Characteristics of Farmers Selling to Large Grain Traders and Evidence of Grain Marketing Innovations from Survey Data

Table 1 compares descriptive statistics between farmers who reported selling maize and soya beans to large-scale traders and/or outgrowers and those selling to other sellers. Noteworthy, the numbers of small holder farmers selling maize and soya beans to large grain traders and outgrowers are relatively smaller. This is more so for maize where only 7.3% reported to have sold to large grain traders, while for soya beans the number is higher, about 27.7%. Despite being fewer in number, examining the characteristics of these farmers in comparison to those selling through other channels brings out a number of salient differences. In general, farmers selling grains to large-scale traders and outgrowers cultivated more land on average (3.87 hectares) compared to other surplus producers who sold through other channels (2.68 hectares). The qualitative insights about farm size was collaborated by the descriptive statistics generated from RALS nationally representative survey. Farmers who sold to large-scale traders and outgrowers were more commercialized and on average had more assets than those who sold to other channels. Although mechanization is low among all smallholder farmers in Zambia, farmers selling through large grain traders and outgrowers were slightly more mechanized compared to those selling through other channels.

Statistical tests for significance (T-tests) between farmers selling maize to large grain traders and outgrowers and those selling through other channels show that there are significantly more male headed households selling maize to large grain traders. The tests also indicate significant difference between the maize sellers selling to large grain traders and those selling to other channels in terms of land cultivated, the level of commercialization, and mechanization. For smallholder farmers selling soya beans, the statistical tests indicate significant differences for the two groups in terms of land cultivated, level of commercialization, and membership to a group or cooperative.

To examine differences in access to grain marketing innovations, we examined access to credit, use of ICTs and private extension services for farmers selling maize and soya beans to large grain traders and outgrowers compared to those selling through other channels. The results show that on average a higher percentage of farmers selling maize and soya beans through large scale traders or outgrowers had access to credit in general compared to farmers selling through other channels. Credit for seed was more popular among the farmers selling to large-scale traders compared to credit for fertilizer. This was the case for soya beans more than maize. The results also show that a higher percentage of farmers selling maize and soya beans to large-scale traders and outgrowers had access to market information through mobile phones and accessed extension services from private sector providers.

Statistical tests of significance on the access to grain marketing innovations between farmers selling maize and soya beans to large grain traders and through other channels provide interesting findings. Access to fertilizer and seed on credit and access to private sector extension were significantly higher for small holder farmers selling maize to large grain traders and outgrowers. In the case of soya beans, only access to private sector extension services showed statistical differences among farmers selling in the two channels.
Table 1. Characteristics of Farmers Selling to Large Grain Trader and Evidence of Grain Market Innovations from Survey Data

<table>
<thead>
<tr>
<th>Grain Market Innovations</th>
<th>Maize</th>
<th>T-test for differences</th>
<th>Soya Beans</th>
<th>T-test for differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sells to large grain traders/Outgrowers</td>
<td>Sell to other channels</td>
<td>sales to large grain traders/outgrowers</td>
<td>Sales through other channels</td>
</tr>
<tr>
<td>Number of farmers</td>
<td>50,105</td>
<td>640,780</td>
<td>23,290</td>
<td>60,869</td>
</tr>
<tr>
<td>Age in years</td>
<td>46.75</td>
<td>47.11</td>
<td>47.31</td>
<td>45.76</td>
</tr>
<tr>
<td>Years of Education</td>
<td>6.12</td>
<td>6.32</td>
<td>6.16</td>
<td>6.47</td>
</tr>
<tr>
<td>Female Head (%)</td>
<td>12.75</td>
<td>21.00 ***</td>
<td>11.93</td>
<td>17.34</td>
</tr>
<tr>
<td>Area Cultivated (Hectares)</td>
<td>3.83</td>
<td>2.68 ***</td>
<td>3.88</td>
<td>3.29 ***</td>
</tr>
<tr>
<td>Household Commercialization Index*</td>
<td>0.63</td>
<td>0.50 ***</td>
<td>0.66</td>
<td>0.54 ***</td>
</tr>
<tr>
<td>Distance to Boma (Km)</td>
<td>35.97</td>
<td>41.00</td>
<td>40.01</td>
<td>39.82</td>
</tr>
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<td>Value of assets (ZMW)</td>
<td>19,286</td>
<td>15,714</td>
<td>24,745</td>
<td>16,426</td>
</tr>
<tr>
<td>Mechanized (%)</td>
<td>1.94</td>
<td>1.00 *</td>
<td>1.39</td>
<td>0.39</td>
</tr>
<tr>
<td>Cell phone used for farming information (%)</td>
<td>36.34</td>
<td>31.79</td>
<td>31.42</td>
<td>29.55</td>
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<tr>
<td>Has a bank Account (%)</td>
<td>16.72</td>
<td>13.15</td>
<td>12.25</td>
<td>13.20</td>
</tr>
<tr>
<td>Group membership (%)</td>
<td>67.52</td>
<td>64.85</td>
<td>73.21</td>
<td>66.64 *</td>
</tr>
<tr>
<td>Access to credit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessed fertilizers on credit (%)</td>
<td>13.5</td>
<td>3.7 ***</td>
<td>7.7</td>
<td>5.9</td>
</tr>
<tr>
<td>Accessed seed on credit (%)</td>
<td>16.0</td>
<td>16.8</td>
<td>20.5</td>
<td>18.20</td>
</tr>
<tr>
<td>Access to credit (%)</td>
<td>43.0</td>
<td>15.1 ***</td>
<td>30.3</td>
<td>29.4</td>
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<tr>
<td>Use of ICTs</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Access to market information through mobile phones</td>
<td>35.8</td>
<td>28.50</td>
<td>30.0</td>
<td>27.6</td>
</tr>
<tr>
<td>Private extension services</td>
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<td></td>
<td></td>
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<tr>
<td>Receives extension services from private sector</td>
<td>46.90</td>
<td>19.80 ***</td>
<td>52.0</td>
<td>33.2 ***</td>
</tr>
</tbody>
</table>

Source: RALS 2015.

Notes: *Household Commercialization Index (HCI) is the value of the total crop sells as a proportion of total crop production. *Statistically significant at 10 level; **Statistically significant at 5% level; ***Statistically significant at 1% level.

4.2. Grain Market Innovations in Zambia

The study finds that the main innovations driven by large grain traders are around six key areas namely: a) structured markets for grains; b) credit finance; c) Information Communication Technology; d) extension and skills transfer; e) weather insurance; and f) Warehouse Receipt Systems. Figure 1 summarizes the interrelationships among the actors and the main innovations centered on large grain traders.

Figure 1 shows that the main relationship is between farmers and large grain traders. However, there are many supporting actors providing various services that facilitate the business the innovator and the beneficiary. Grain flows from farmers to grain traders then to off-takers (processors). Using the future harvest as collateral, credit is channeled to farmers through input suppliers. Credit finance seldom goes straight to farmers with few exceptions. For example, the Lima credit scheme facilitated by the ZNFU and commercial banks enables farmers to access inputs and equipment directly with repayments done over a number of seasons.
4.3. Location of Grain Market Innovations and Investments

Grain marketing innovations and investments have been following areas with surplus production of maize and soya beans, which are the main crops of interest for the large grain traders. Figures 2 and 3 show the percentage maize and soya beans sales to large scale traders and out growers respectively.

Figure 2 shows that most of the maize sales by smallholder farmers to large grain traders and out growers takes place in three provinces, Eastern, Central, and Southern Provinces. In the 2014/15 marketing season, maize sales to large grain traders and outgrowers amounted to 241,000 MT, with Central Province accounting for the bulk of the sales (53%), followed by Eastern Province (24%) and Southern Province (14%). On the other hand, Figure 3 shows that soya beans smallholder sales to large grain traders and outgrowers were mostly concentrated in Central and Eastern Provinces. In 2014/15 marketing season, soya beans sales to large grain traders and outgrowers was close to 15,000 MT with Central Province contributing 56% whilst Eastern contributed 34%.
Figure 2. Percentage of Smallholder Farmers Selling Maize to Large Grain Traders and Outgrowers

Source: RALS 2015.

Figure 3. Percentage of Smallholder Farmers Selling Soya Beans to Large Grain Traders and Outgrowers

Source: RALS 2015.
4.4. Main Innovations Shaping the Relationship Traders and Farmers

4.4.1. Structured Markets for Grains

The entry and expansion of large grain traders in Zambia’s grain markets has transformed grain marketing from one, which was dominated by small fragmented spot traders—sometimes referred to as *briefcase businessmen*—into more formalized and structured trading in their areas of operation. This transformation has helped to boost the production of soya beans among smallholder farmers—a crop which was previously the domain of the large commercial farmers. Large grain investments have facilitated the movement away from spot markets (one off relationship) to more structured grain markets (more formal ongoing relationship between buyers and sellers) for smallholder farms through models such as pre-financing, contract farming, and forward contracts.

**Contract:** pre-financed farmers receive financing for inputs (mainly seed, fertilizers, and chemicals). The most common agreement is for the farmer to pay back at harvest, where the input costs are deducted from the value of the commodities delivered to an off-taker. In a few cases, pre-financed farmers are only obligated to pay back the value of the loan contracted with interest and they are free to sell to anyone. Through contract farming, a formal contract is signed for the inputs received and often includes a clause on exclusive supply of agreed quantities to the grain trader. The main large traders in Zambia providing contract farming for maize and soya beans are NWK Agri-services and Cargill with operations in Eastern and Southern.

**Forward Contracting:** A marketing arrangement where a contract is signed between farmers and the grain trader at planting time, indicating the quantities to be supplied after harvest and the price. In this agreement, there is no pre-financing of inputs for the farmers. Through forward contracts, farmers are offered a guaranteed market for their produce at an agreed price, while the grain trader is assured of grain stocks for the marketing season.

**Picture 1. Maize/Soya Beans Being Loaded into Silo Bags—Also Referred to as Hematic Bags—for Long Term Storage at NWK Agri-Services in Mpongwe**

Source: IAPRI.
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Picture 2. Soya Beans Mostly Bought through Forward Contract from Smallholder Farmers in Mkushi during the 2015/16 Marketing Season by Afgri Corporations

Through this arrangement, farmers have an assured market and stable price, offsetting the effects of seasonal price volatility. Afgri Corporation is the main grain trader involved in forward contract arrangements with smallholder farmers. Afgri Corporation has been able to purchase about 15,000 MT of maize on forward contracts in the 2016/17 marketing season and is expanding to more districts in Zambia.

The direct link between smallholder farmers and off-takers has been weak. However, this is changing with off-takers such as Mount Meru, an oilseed processor engaging directly with smallholder farmers. Through finance provided by the Food Trade Eastern and Southern Africa, Mount Meru has provided an input pack of soya beans for growing up to 0.25 Hectares to about 500 farmers in the previous agricultural season. They are ambitious in expanding their reach to 2,000 farmers in the next farming season (2017/18).

4.4.2. Credit Finance

Credit access is critical for the growth of smallholder sector, as it increases access to inputs for production as well as facilitates access to capital for items such as tractors and inputs. Large grain traders in large part account for the increased access to credit in the areas of operation for two main reason. Firstly, large grain traders have the ability to mobilize local and foreign financing, which they use to lend to smallholder farmers through pre-financing and forward contracting. Secondly, increased marketing of maize and soya through large grain traders has attracted various service providers including formal financial institutions.

One of the key innovation enhancing credit access has been the Lima credit scheme facilitated through the ZNFU. The Lima credit scheme links maize and soya beans farmers to various players including financial institutions who provide farmers for production loans.

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1 Mount Meru received funding through the Food Trade East and Southern Africa, the Challenge fund, which supported them to finance farmers.
input suppliers providing seed, fertilizer, and chemicals on credit and with the large grain traders as off-takers. By the end of 2015, the scheme had reached 18,690 beneficiaries.²

Farmers who had access to Lima Credit were concerned that the interest rate on credit received through some of the loan programmes was too high. For example, the farmers indicated that for farmers participating in the Lima credit scheme, their interest rate was not fixed within the season and some farmers had to pay more than they had anticipated. For example, in 2015 the interest rate nearly doubled from 16% to 28% causing a drop in the loan recovery rated from 100% in the previous year to 87%, while the number of beneficiaries dropped from 18,690 in 2015 to 6000 in 2016. In addition, farmers were also concerned that there was no explicit agreement with grain traders and off-takers, making the link between the Lima credit and grain marketing a weak one.³

Other than ZNFU facilitate loan scheme, other sources of credit reported by farmers include One Acre Fund and Seba Foods. One Acre Fund Initiative was providing seasonal input loans for seed and fertilizer. The loans were to be repaid soon after harvest with interest. One Acre Fund targeted individuals organized in groups. To a lesser extent, credit was also being provided by food processing companies such as Seba Foods, which provided soya beans inputs on credit and provided a market for soya beans from smallholder farmers.

Seasonal credit innovations have increased access to finance for farm equipment such as tractors, trailers and planters etc., that support smallholder mechanization of farm operations. For example, the ZNFU has been instrumental in promoting financing for tractors and equipment through a programme called “Bunjimi assets plus” in collaboration with the National Savings and Credit Bank—a public bank and linked farmers to large grain Traders such AFGRI's Forward Supply contracts in Kabwe, Mkushi, and Mumbwa districts. AFGRI purchased 15,000 MT of maize on forward contracts in the 2017/17 marketing season.

AFRGI Corporation had its own farm loan innovation that promoted financing for equipment where farmers obtained credit for tractors and implements and repayments were made in both cash and in kind (through grain)—for an initial down payment of 30% of the total value of the tractor and implement. This innovation, also referred to as the Tractor for Maize Scheme, ran from 2012 to 2015 with support from Musika Development. This financing innovation was discontinued due to the exchange rate risk, depreciation of the Kwacha, and drought (Adu-Baffour et al 2018). Further, the volatility of grain prices attributed to the unpredictable policy environment for the maize sub-sector was yet another factor for discontinuing the innovation. When asked about whether they knew about these mechanization loan facilities, most of the farmers interviewed indicated that they were not aware of the availability of the credit facility for mechanization purposes, hence, most of them relied on animal draught power.

² Based on personal interviews with ZNFU.
³ Based on personal interviews with ZNFU
4.4.3. Information Communication Technology

Access to various Information Communication and Technologies (ICTs) can provide farmers with market intelligence and extension messages at a low cost. With the presence of large grain traders, ICT innovations have been on the increase. For example, the ZNFU working with grain traders initiated a SMS based market intelligence platform called ZNFU 4455 that regularly provides updated prices for grains and grain traders in different locations at a minimal cost to farmers. Another application called e-extension has been developed for farmers to receive extension tips. ZNFU also provides market intelligence information to internet enabled farmers on a weekly basis. Large grain traders are also riding on other low cost innovations such as mobile payment options for settling payments. For example, NWK settles most of its payments through mobile payments although most farmer still prefer to receive cash.

Picture 4. ICT Innovations for Smallholder Farmers: The ZNFU 4455, a Mobile Phone Based Marketing Intelligence Platform and E-Extension for Extension Messages

Source: ZNFU.
4.4.4. Extension and Skills Transfer

Knowledge and skills transfer through extension services are key to achieving high productivity and technology adoption for smallholder farmers. To that effect, some grain traders have developed extension systems that are aimed at increasing smallholder productivity and marketed surplus to them. Farmers are being equipped with knowledge in practices such as Conservation Agriculture, business skills such record keeping, basic profit and loss accounting, and crop marketing. For example, NWK Agri-services has extended their successful extension program in cotton to maize and soya beans. Their investments in extension services has reduced the farmer ratio of about 1:100 to about 1:50. A unique feature of their extension system is the adherence to key performance indicators, such as number of farmers visited, number of farmers adopting practices and yields among others. This has led to farmers attaining higher yields. NWK Agri-services reported that in 2015/16 season, their extension programme reached up to 18,000 maize farmers, 4,000 soya beans farmers and 70,000 cotton farmers.

Box 1. Spillover Effects of Market Innovations

Gerald Susha, the owner of Gerald Sales Agency, is a medium scale grain trader operating in Kapiri-Mposhi district in Central Province. Located in the market, Gerald attracts several farmers who deliver maize and soya beans, which he bulks and sells to off-takers in Lusaka and Copperbelt or to large grain traders including Export Trading Group (ETG) and Afgri Corporation.

In the 2016/17 marketing season, Gerald purchased 1,500 MT maize and 1,000 MT of soya beans. Gerald has developed relationships with farmers based on trust. Like the big traders, Gerald has started providing inputs (seed and fertilizer) on credit at the beginning of the farming season, which farmers repay in grain after harvest. In the 2016/17 marketing season, Gerald supplied farmers with 1,500 kilogram (kg) of maize seed, 500 kg of soya beans seed and 6,000 kg of fertilizer. In addition, he provides farmers with tillage and planting mechanization services as well as transport services in his light pickup truck. Gerald aspires to construct a large storage facility, but is constrained by the unavailability of long term financing.

Source: Interview Mr. Gerald Susha medium scale trader in Kapiri-Mposhi District.
Knowledge and skills transfer has been extended to grain aggregators who are mostly smaller grain traders in rural Zambia. The aggregators are linked to supply large grain traders and receive training in financial literacy, record keeping and management, contracting, and compliance among other things through a programme run by the World Food Program (WFP), in collaboration with non-profit organizations such as Musika Development Initiatives. The aggregator training programme is credited for the increased professionalism among the small traders, as they are increasingly utilizing measuring scales and grades when purchasing grain from smallholder farmers. In turn, this has earned these traders a good reputation and trust from farmers. Box 1 above demonstrates some positive spillovers from such extension and skills training programmes.

4.4.5. Weather Index Insurance

Weather related risks to agriculture have necessitated demand for crop insurance. Hence, some grain traders are facilitating smallholder farmers’ access to crop insurance, particularly weather indexed insurance. For example, NWK Agri-services has partnered with Mayfair Insurance to provide weather index insurance to about 3000 small scale farmers in Southern Province, Choma District. The insurance is provided as part of the inputs credit to all farmers contracted by NWK. During the FDs, respondents indicated that some farmers had started to demand crop insurance on their own. Weather index insurance has also been offered to farmers as part of loans offered through the ZNFU’s Lima credit scheme.

The major challenge cited was that most rural farmers did not understand how the weather index insurance worked and at times felt cheated by the insurers. There have been some instances when some farmers who experienced yield losses due to weather shocks but could not be compensated because of the weather data used by the insurer. Given that crop losses can be caused by many factors, the Weather Index Insurance was particularly difficult to implement especially where there is no clear-cut relationship between loss and the indexed weather peril. This has resulted in insurance premiums becoming too high and unaffordable for many poor smallholder farmers (IFAD 2011). In addition, the use of intermediaries such as grain traders by the insurers was considered to be a less optimal way of educating farmers because the traders were not experts in insurance.

4.4.6. Warehouse Receipt System

The Warehouse Receipt System is among the important innovations shaping grain marketing as well as enhancing credit access for farmers. Warehouse Receipt Systems are operated by the Zambian Commodity Exchange (ZAMACE), which is the Authorized Agency for implementation of the warehouse receipt system under Agricultural Credits Act 35 of 2010 (Government of Zambia 2010). Through the WRS, a farmer or trader can deposit their grain at a ZAMACE certified warehouse and be issued a warehouse receipt. The receipt could then be used as collateral to access finances for more grain purchases by traders or purchase agricultural inputs or implements by the farmers. Other benefits of using ZAMACE include delaying grain sales until when prices are highest as well as opportunities for forward contracts.

Musika is a Zambian non-profit company that works to stimulate private sector investment in the smallholder markets.
Currently, ZAMACE had certified four warehouse operators with a total storage capacity of about 800,000 MT for the warehouse receipt system. The certified warehouses are located in about 18 districts of Zambia. Most of these are large grain traders including Afgri Corporation, CHC Commodities Limited, NWK Commodity Services Limited, and Zdenakie Limited. However, transactions conducted through ZAMACE are still very low. As of 15th November 2017, only 180 MT of maize had been traded using ZAMACE.

This situation is not peculiar to Zambia alone. The failure by governments to embrace platforms such as ZAMACE to fill the country’s strategic grain reserve means the issue of volume required to make them sustainable cannot be easily addressed. In addition, the direct market interventions by the government agency hinders the private sector from investing in such a platform. Studies in the region have highlighted some challenges associated with operating commodity exchanges (see Sitko and Jayne 2012; Chapoto and Ramadhan 2015). For example, commodity exchanges like ZAMACE have not been very successful in attracting financial institutions to fund the activities of the exchange or honor the warehouse receipts. Also, the assumption that the commodity exchange and or the WRS will have direct benefits to smallholder farmers often leads to the failure of the system from the onset. Instead, such systems require larger farmers to initially participate with smaller farmers benefiting from more structured markets with good market information, functional storage facilities, and competitive pricing. Small-scale farmers can also benefit through aggregation.

4.4.7. Aggregator Model in Zambia

The World Food Programme (WFP) has been championing smallholder grain market development in Zambia through an aggregation model in Zambia. Through this model, WFP seeks to build a structured grain market, which links smallholder farmers to formal markets locally and regionally. This is achieved by promoting a demand driven platform and strengthening farmers’ resilience through selling in structured markets. Through aggregation centers, a network of credible aggregators are selected and trained in how to purchase grain professionally and are linked to formal markets including platforms such as ZAMACE. Out of a total of 269 aggregators assessed national wide by the end of 2017, WFP had selected 50 aggregators, as they had trust of smallholder farmers and the confidence of off-takers and financial institutions (Cammelbeeck 2017- personal communication). The aggregators were trained in financial literacy, record keeping and management, contracting, and compliance among other things.
To ensure that there was a sustainable demand for smallholder farmers products, WFP in collaboration with the Zambian government implements the Home Grown School Feed Programme, where the commodities such as maize, soya beans and cowpeas are sourced from local aggregators. Through this approach, schools provide local farmers with a predictable outlet for their products, leading to a stable incomes for both farmers and aggregators.

In addition, WFP has been piloting a virtual farmers market called Maano-Virtual Farmer’s Markets (VFM) three rural districts of Zambia. The Maano mobile application, launched in May 2017, targeted 2,500 Zambian farmers during the 2017/2018 marketing season. The virtual market aims to connect farmers and buyers, and enable them to negotiate prices and make transactions through a smart phone application. In doing so, VFM would make rural smallholder farmers visible to new buyers, reduce transaction costs for both buyers and farmers and increase the profitability and scale of trade for both sides (WFP 2017).

**Picture 6. Maano Virtual Farmer’s Market Application**

5. CONCLUSIONS AND RECOMMENDATIONS

With increased investments in Zambia’s grain markets, there have been a number of innovations brought about mostly by the large grain traders, most of whom are multinational firms. The innovations included creation of more structured markets for grains, credit financing for smallholders, ICTs for smallholder farmers, private sector extension services and skills transfer, weather insurance, and the WRS. The investments and innovations are mostly concentrated in surplus producing areas of two main commodities—maize and soya beans. Thus, they are concentrated in Central, Eastern, and Southern Provinces of Zambia. These innovations are a business strategy for large grain traders in order to fulfil their commercial objectives such as securing grain access from farmers, increasing smallholder’s productivity, and lowering transaction costs. With repeated transactions with farmers there has been movement away from spot markets to more structured markets through pre-financing, contract farming or forward contracts lowers transaction costs such as searching costs.

Smallholder farmer’s benefits through these innovations included access to assured markets provided by large grain trader, better access to the much needed credit for inputs, and purchases of large equipment such as tractors and implements. With increased access to knowledge on production and business skills provided through private sector extension services, farmers increase their productivity and technology adoption by using smart agricultural practices. Increased use of ICTs enhance access to market and other information, while weather index insurance enhances risk management in case of poor weather. Through warehouse receipt systems, farmers have better access to credit and farmers can get a premium on high quality grains.

This study shows that farmers selling to large grain traders have better access to these innovations and associated benefits. In general, larger, more commercialized and better-off farmers benefited from these innovations.

Private sector-led grain market innovations have generally happened within a supportive policy environment, a thriving domestic market supporting demand from off-takers and export markets absorbing grain surpluses. However, the momentum with which the grain investments and innovations have taken off is negatively affected by an ad-hoc and often inconsistent trade policy environment. Contracting arrangements between large grain traders and farmers have reduced owing to the unpredictable policy environment for grains especially export bans on maize, which lead to price volatility. The policy uncertainty also threatens forward contracting with grain traders which have proved to be difficult to be enforced in an unpredictable policy environment.

Despite the positive benefits of the main grain market innovations happening in Zambia, farmers growing maize and soya beans under contract lamented the absence of lucrative output price agreements leaving them vulnerable to market forces. Further, there is limited understanding of how the weather index insurance works, which affects their demand for the insurance.

The study makes the following recommendations:

1) Zambia has great potential of becoming a regional bread basket without over burdening the fiscus with subsidising both production and consumption. Thus, the government must continue fostering effective private sector market development through predictable and stable policies. Government must avoid imposing ad hoc
export bans as they lead to price volatility which discourage grain traders’ investments and innovations. By maintaining, a sizeable strategic grain reserve and purchasing maize from farmers in outlying areas, government will encourage private sector to take the lead in grain marketing, while it invests more resources in the key drivers of agricultural development such as road infrastructure especially feeder roads

2) ZAMACE would help bring sanity to the market if it can be capitalized. The FRA as a big public player should take the lead and help hasten capitalize ZAMACE by utilizing the platform to manage the strategic reserves. Also, there is need to enhance awareness and implementation of the ZAMACE’s warehouse Receipt System a price discovery system among farmers countrywide.

There is need to moderate price volatility trough a well-managed trade regime. Ad-hoc export bans work against private sector innovations and investments and curtail benefits to smallholder farmers. Government policies must be transparent and predictable in order to encourage private sector participation.

3) Cooperatives if properly organized and managed could provide a major link with grain traders and can be a useful vehicle to reach more farmers with grain market innovations. Farmer cooperatives and farmer organizations could provide aggregation services, thereby, helping smallholder farmers with more bargaining power and reducing the cost of doing business for the grain market innovators.

4) There is need to enhance a pluralistic approach to extension service delivery to enhance farmer productivity as well as help develop the capacity of farmers to think of farming as a business.
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