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A compelling case for seed enterprises as a tool for rural development in the smallholder farming sector

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ABSTRACT

This study analysed the community seed business developed by the Seeds and Markets Project (SAMP) managed by GRM International. The community seed business developed was named Zaka Super Seeds and was later named Zimbabwe Super Seeds as it grew to serve areas beyond a single district. Our analysis showed the immense potential for a profitable community seed enterprise managed commercially. The amount of seed produced and processed by the enterprise rose from 26Mt to 151Mt in three cropping seasons. The enterprise supplied seed that commercial companies shunned, like cowpeas, sugar beans, and small grains. Local seed production offered farmers more income compared to growing commodity crops, for example maize seed sold for US\$305 more per tonne than grain. Local seed supply was improved by the development of the community seed business. The multi-stakeholder approach used by SAMP made the business more sustainable. The community seed business, which now has agro dealers across the whole country, provides insight for future development programmes related to the seed industry.

Key words: community seed enterprise, certified seed, cowpeas, smallholder seed production, sugar beans, Zimbabwe

RÉSUMÉ

Cette étude a analysé l'industrie des semences communautaires développée par le Projet de Semences et Marchés gérée par GRM International. L'industrie des semences communautaires développée a été nommée Zaka Super Seeds puis ensuite Zimbabwe Super Seeds, puisqu'elle a évolué pour desservir des zones au-delà d'un seul district. L'analyse a montré un immense potentiel d'une entreprise de semences communautaire rentable gérée commercialement. La quantité de semences produites et traitées par l'entreprise est passée de 26Mt à 151Mt en trois saisons de culture. L'entreprise a fourni des semences que les entreprises commerciales ont rejetées, comme le niébé, le sucre et les petits grains. La production locale de semences a donné aux agriculteurs plus de revenus par rapport aux cultures de base, par exemple, la semence de maïs vendue pour 305 \$ US de plus par tonne que le grain. L'approvisionnement local en semences a été amélioré grâce au développement des entreprises des semences communautaires. L'approche multipartite utilisée par le projet mentionné ci-dessus, a permis une durabilité de l'entreprise. L'entreprise des semences communautaires, qui compte aujourd'hui des agro-entrepreneurs à travers tout le pays, donne un aperçu sur des futurs programmes de développement liés à l'industrie des semences.

Mots clés: entreprise de semences communautaires, semences certifiées, niébé, production de semences pour les petites exploitations, haricots, Zimbabwe

INTRODUCTION

The seed industry is very specialised in that it is highly regulated and standards in production and postharvest handling of the seed are strict. Smallholder farmers in Zimbabwe are not very active in seed production due to limited land size, poor access to other required resources and production inputs and also lack of enabling regulations (Munyaka *et al.*, 2015). Smallholder farmers are mainly active in the so called 'informal' seed sector, and supply 90-100% of the seed requirements of that sector, depending on the

crop (Maredia *et al.*, 1999; CIAT *et al.*, 2009). Crops such as bambara nut (*Vigna subterranean* L.), rapoko (*Eleusine coracana* L.), cowpeas (*Vigna unguiculata* L.) and sugar beans (*Phaseolus vulgaris* L.) fall into that category. The seed supplied on the informal market is not regulated, and hence has no guarantee of quality. Some commercial seed companies require a minimum of 20 ha for a farmer to be considered for maize seed production and this effectively excludes the majority of smallholders. The minimum size is to make it easy for a farmer to adhere to the large isolation distance,

A compelling case for seed enterprises as a tool for rural development

up to 360 m for hybrid maize seed production, required between a seed crop and other crops likely to be a source of contamination (Statutory Instrument 213 of 2000). Since smallholder farmers in southern Africa and elsewhere are not consulted by commercial seed companies on issues to do with ideal crops for them, the seed available from these companies rarely meet the requirements of such farmers. Smallholder farmers in Africa are approximately 33 million in number and form 80% of farms in the region (IFAD, 2011). Even with such high numbers of smallholder farmers, agricultural seed supply is controlled by 20% of the remaining larger farm units. Smallholder farmers are mainly involved in the seed production of relatively minor crops such as cowpeas, sorghum and bambara nuts (Dawes *et al.*, 2009). However, major opportunities exist for the production and distribution of seed that thrive under smallholder conditions (FAO, 2010) and smallholders have demonstrated success in setting up seed enterprises (Guei *et al.*, 2011).

Earlier studies in Zambia demonstrated that smallholder farmers can produce good quality seed of groundnuts, sorghum and cowpeas (Tripp *et al.*, 1998). However, such seed production initiatives have remained largely informal, not allowing wider access by the majority of the smallholder farming community because the commercial aspect is seldom addressed.

Victoria Seeds Limited in Uganda demonstrated that there is great potential for smallholder farmers, especially women, to produce seed as well as increase business capacity (Malcom, 2016), and similar success has been experienced in Cameroon (Guei *et al.*, 2011). The increase in volume of seed and employment created by Victoria Seeds Limited is a good example of how community business enterprises for smallholder farmers can be supported using neglected seed crops. In the past, neglected crops did not have high commercial value, leading to a correspondingly low seed price.

The National Smallholder Farmers Association of Malawi (NASFAM) has successfully helped farmers produce and market seed. The main thrust of NASFAM is knowledge for farmers, commodity markets and value addition. NASFAM also functions as an aggregator for commodities such as rice, which allows for the power of volumes in market negotiations (NASFAM, 2016). The scale and strength of NASFAM shows the high potential that smallholder farmer production has, when it is organised to supply formal markets.

The Swiss Agency for Development Cooperation (SDC), a donor agency, considers seed security as an important component of food security for the resource-poor. The SDC contracted GRM International (GRM)

to implement a Seeds and Markets Project (SAMP) for the marginalized farmers of Zaka District in Zimbabwe from 2010 to 2013. The SAMP was implemented in collaboration with another SDC funding initiative called the Harmonised Seed Security Project (HASSP) implemented through the Food and Policy Analysis Regional Network (FANRPAN). The SAMP was multi-country, covering Lesotho, Swaziland and Zimbabwe. The HASSP focused on Malawi, Zambia, Swaziland and Zimbabwe. The two projects cooperated in countries where they operated together since they were all SDC funded. The projects focused on linking farmers to markets and increasing seed access and availability for the marginalised farmers. During the inception phase of SAMP, GRM conducted community consultation meetings in all the chosen 22 wards (administrative areas) of Zaka district. The community consultations focused on what seed the farmers preferred and the challenges they faced in accessing seed. Initial investigations indicated that there was high usage of retained seed for crops such as maize (*Zea mays* L.), sugar beans (*Phaseolus vulgaris* L.), sorghum (*Sorghum bicolor* L.), cowpeas (*Vigna unguiculata* L.), groundnuts (*Arachis hypogaea* L.), rapoko (*Eleusine coracana* L.) and bambara nuts (*Vigna subterranean* L.) (Anonymous, 2010). The findings were consistent with those by Foti *et al.* (2007), in which seeds for legumes were in short supply and expensive. The majority of the farmers (80%) indicated they did not have access to seed of their preferred crop timely and in the correct quantities (Anonymous, 2011) and, indeed, many improved varieties have not yet found their way to farmers at all (Rorhbach *et al.*, 2001). The findings, by SAMP, through community consultations on seed in Zaka district, were that: (a) seed of some crops such as bambara nuts, rapoko and rice was completely unavailable as certified; (b) hybrid seed maize was readily available but its price was unaffordable to resource-poor families; (c) farmers were willing to be engaged in seed production; and (d) linkages with commercial seed companies to engage farmers as contract growers was explored but was not viable and sustainable because of remoteness as well high price expectations by farmers.

During discussions facilitated by SAMP, farmers proposed formation of a farmer seed growers association registered with the seed certifying authorities who would then allow the farmers to produce, process, pack and market their own seed. Zaka Super Seeds was, thus, born. The availability of quality seeds at the right time and price has implications on a farmer's ability to produce high yields and hence, improved livelihood. In some cases, farmers grow crops they do not prefer due to lack of seed of their crop of choice. The ability by smallholder farmers to

produce certified seed increases access to such seed in the local community. The current study sought to find out if smallholder farmers could successfully produce seed and manage a community seed company, and whether seed production by the community would increase crop diversity. The findings would provide a model for smallholder seed production and recommendations which would influence policy in seed production in Zimbabwe and the rest of the Southern African Development Community (SADC) region. Since seed is high value compared to grain, the potential for smallholder farmers to increase income was a major consideration in the study.

The study was premised on the hypotheses that smallholder farmers can develop sustainable seed production enterprises, produce certified seed and finally, increase income by venturing into certified seed production. Hence the objectives were to assess; a) the potential of developing a sustainable smallholder seed enterprises, b) the capacity of smallholder farmers to produce certified seed, and c) the profitability of seed production for smallholders compared to commodity (food grain) production.

MATERIALS AND METHODS

Study site and stakeholder engagement. The study was conducted in the Zaka district of Masvingo province in Zimbabwe (Fig. 1). The seed crops were planted in soils ranging from sandy loams to heavy clays in an area receiving 400 -500 mm of rainfall annually or had access to irrigation. Ten wards were selected on the basis of rainfall amount, soil types and crops normally grown successfully by local farmers. Zaka district is composed of areas with three agro ecological zones (known as natural regions locally); region V (38% of Zaka), region IV (40%) and region III (22%). Natural region V receives less than 450 mm of rainfall per year while region IV receives 450-600 mm and region III, 650-800 mm.

A multidisciplinary approach was adopted in the study, based on an understanding of the socio-economic and bio-physical factors faced by the community. Stakeholders with the desired skills were engaged in order to achieve the desired output (Table 1).

Table 1. Stakeholders engaged and their roles in the community seed business in Zimbabwe

Name of Stakeholder	Role in the seed business
Seed Services in the Department of Research and Specialist Services	Seed inspection and training of Agricultural Technical and Extension Services (Agritex) field officers on quality standards
CIMMYT	Technical training and supply of maize foundation seed
The Crop Breeding Institute	Technical training of extension workers and provision of breeder seed.
Agricultural Research Council	Advisory, policy, advocacy and lobbying. Linkages and liaison with the Ministry of Agriculture and Mechanisation
CIAT	Technical training and sourcing of legume germplasm
Agritex	Farmer training at ward level. Extension to seed growers at each ward. Monitoring of seed growers within each area
Plant Quarantine Services	Training of Agritex officers on pests and diseases. Crop inspections for diseases and pests
Harmonised Seed Security Project (HASSP)	Financial support and technical advice on strategic direction and regional harmonization of seed regulations.

CIMMYT = The International Maize and Wheat Improvement Center; CIAT = International Center for Tropical Agriculture, Agritex = Department of Agricultural Technical and Extension Services (Government Extension Service Provider in Zimbabwe)

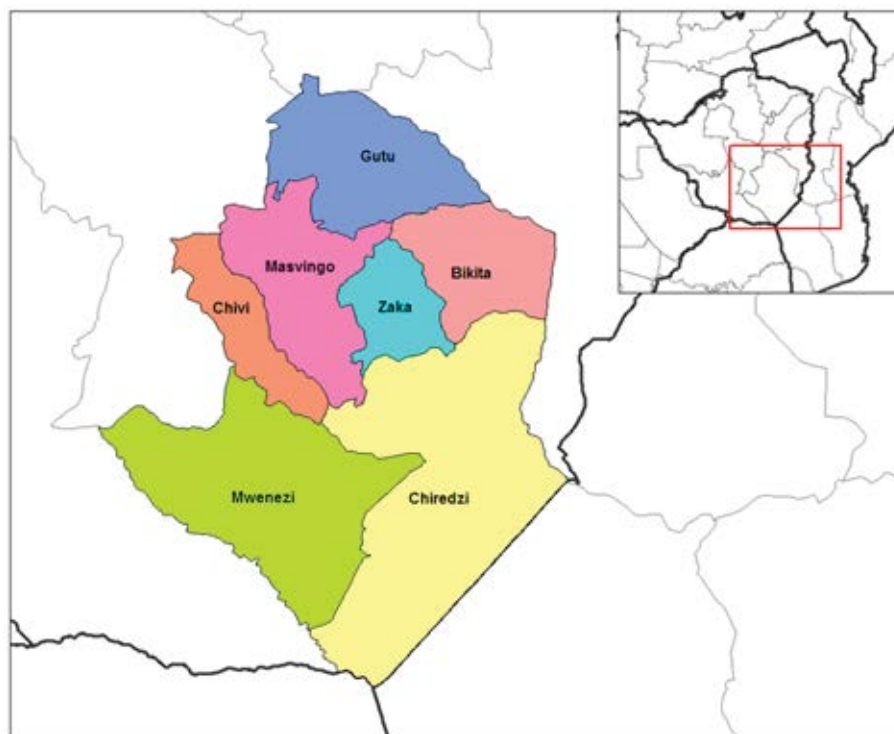


Figure 1. The location of Masvingo province and Zaka district where the community-based seed enterprise was located.

Community mobilisation and Focus Group discussions. Community engagement was done at ward centre level in order to reach as many farmers as possible by reducing walking distance to the meetings. Sensitisation meetings were conducted a week earlier, in preparation for the days when focus group discussions (FGDs) would be conducted. Thirty-four FGDs were conducted in Zaka district. On the day when FGDs were conducted, the community was divided into different groups based on such factors as age, occupation, sex and marital status. The local leaders made up of councillors and headmen and their spouses, were identified and interviewed separately from the groups. This was to minimise bias by respondents through fear of local leadership by some community members. The main findings of the community engagements were that: (a) the community was not seed secure; (b) there had been a downward trend in seed production due to a number of factors including droughts and the unfavourable macro-economic environment; (c) the suppliers of hybrid seed were commercial seed companies like SeedCo, Pannar, Pioneer, Agri-Seeds and other small companies; (d) due to the prevailing macro-economic situation, commercial seed had not been available in the district through the normal

value chain (i.e. seed supplier, wholesaler, and agro-dealer). Although non-governmental organisations had distributed open-pollinated varieties (OPVs) of maize, there had not been a significant improvement in seed production due to lack of knowledge of these varieties, poor storage facilities and absence of processing facilities in the area. In Zimbabwe and other SADC countries with strong commercial seed companies, there has been vigorous promotion of hybrid seed compared to OPV seed. This is mainly because commercial seed companies preferred to market hybrid seed which has a higher profit margin than OPVs. They also understand that OPVs would encourage seed retention and reduced sales. While some wards had been assisted by some development agencies to construct seed banks, there had not been significant seed inflows into these seed storage facilities.

Setting up the company

The Seed Act of Zimbabwe Chapter 19:13 allows registered farmers' associations to be accorded certifying agency status once a constitution and regulations governing the members on seed production procedures were in place. GRM through SAMP assisted the farmers in developing

the constitution and the regulations and finally all farmers in the 10 wards interested in seed production formed Zaka Seed Growers Association. The farmers agreed to form a registered company, Zaka Super Seeds, to manage the marketing of their seed. The organogram presented in Figure 2 shows the relationship between the company and the Association. The Association members owned the company through shares and they were all contracted as growers to produce seed. The Zaka Seed Growers Association appointed directors to the company which was run by a full-time secretariat (appointed by the directorate) of qualified professionals. GRM coordinated the activities of a number of organisations (Table 1) that were not part of the structures of the company but helped set-up and train the personnel put in place by the farmers' association. All farmers at ward level had the opportunity of being shareholders in the company if they wanted. The membership to the Zaka Seed Growers Association was compulsory to all member farmers and a US\$5.00 joining fee was levied.

The Zaka Seed Growers Association was first registered with the Seeds Services, the Government of Zimbabwe's Regulatory Authority, as a certifying agency in the 2010/2011 cropping season. This enabled the Association to produce certified seed of maize, sorghum, cowpeas, rice and sugar beans, initially and market its own brand name in the years 2011, 2012, 2013 and 2014. Zaka Super Seeds, the commercial company, was registered with the

Registrar of Companies in the 2013/2014 cropping season and was later renamed Zimbabwe Super Seeds as the company spread to other districts in Zimbabwe.

Training in seed production and agri-business

A needs analysis for training extension staff in the selected 10 wards was conducted jointly by SAMP and the Department of Agricultural Technical and Extension Services (Agritex). A questionnaire to gauge seed production knowledge of extension staff was administered in all the selected 10 wards. The needs identified were used to formulate training programs for the extension staff. Thirty-three extension staff including six supervisors underwent an intensive training of trainers in seed production so that they could later train farmers in their respective wards. The overall reach in training for extension staff was 142 (93 male, and 49 female). Thirty-three extension personnel from the seed producing wards were trained more than twice as they were instrumental in supporting farmers. The training was composed of theoretical and practical sessions. The presence of trained Agritex officers at ward level made technical advice easily accessible for farmers as they were able to walk to the nearest officer to get information.

The training in specific areas outside the skills base of Zaka Seeds and its partners was out-sourced. Such training like business development was done to equip the local district committee, composed of farmer

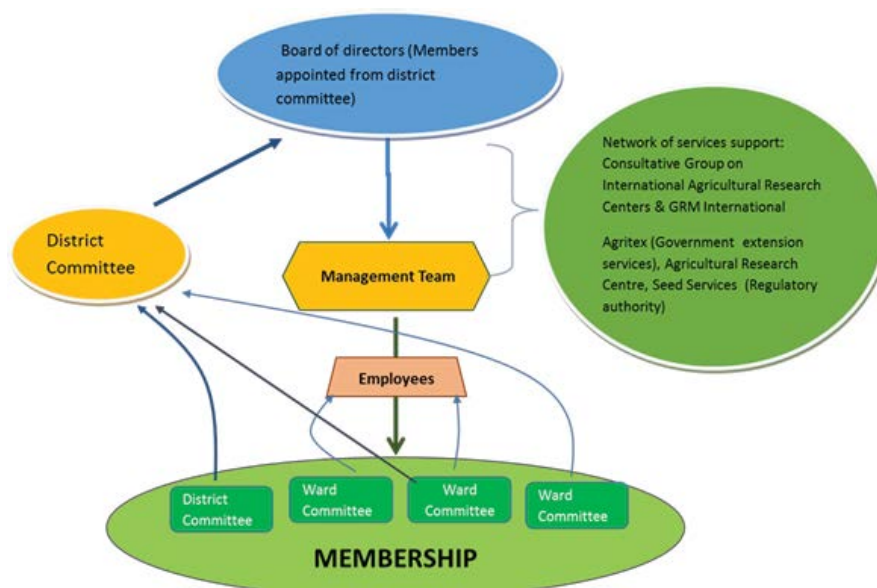


Figure 2. The relationship between Zaka Super Seeds and Zaka Seed growers Association and other organisations supporting Zaka Super Seeds

representatives, with key decision-making skills for the seed business. The involvement of the farmers increased the ownership of the project as decisions were made by users. Previous studies have shown that overall efficiency was reduced when beneficiaries are not allowed to make direct contribution to the running of projects that are supposed to benefit them (Langyintuo and Setimela, 2009). Seven training sessions targeting farmers and their representatives were conducted by CIMMYT, Seeds Services, CIAT and GRM. All the seed producers received training in seed production. The district management committee was trained in special business skills. The training sessions were attended by 31 participants (17 males and 14 females).

The seed production process. The area under seed production was registered with Seed Services, the Seed Regulatory Authority, and an inspection fee of US\$10.00 per hectare was paid. All certified seed was produced from foundation seed. The varieties grown and the sources of foundation seed are listed in Table 2. After inspection of land to determine land size and whether the previous crop was compatible with the intended crop to be grown, each farmer received an appropriate seed package.

Agritex staff selected farmers to be seed growers based on criteria developed jointly with GRM International project staff. The main focus was the ability of the farmer to handle seed through existing infrastructure, possession of assets such as tillage equipment and ability to purchase inputs such as fertilizers and

chemicals. Since the farmers had small landholdings, they were encouraged to plant at about the same time to facilitate synchronization of subsequent activities such as processing, transportation and marketing of the seed in bulk. From 2010 to 2012 all foundation seed distributed to farmers was acquired from the Crop Breeding Institute. However, the supply was erratic, necessitating the production of own foundation seed by Zaka Super Seeds. Seed growers who had shown exceptional skills in producing certified seed were engaged to produce foundation seed.

For both certified and foundation seed, farmers had to pay attention to many factors including diseases, pests, weed infestations and isolation distances. Extension staff in each ward conducted preliminary inspections before Seed Services inspectors were invited. The preliminary inspections by Agritex staff reduced the workload for the Seed Services staff as some crops were disqualified during that process. In addition, extension staff helped the farmers to carry out all critical seed production operations at all growth stages of the crops and these included the timing for pests and diseases control, fertilize application, and roguing.

At inspection time, the Seed Services inspectors were joined by inspectors from the Plant Quarantine and Phytosanitary Services Unit. The inspections were carried out on randomly chosen fields which were representative of the whole crop produced by the company. A 10% minimum threshold per ward

Table 2. Varieties produced by Zaka Super Seeds and the cost of foundation seed in Zaka district, Zimbabwe

Seed Crop	Variety	Supplier	Cost (US\$)/ kg
Maize	ZM309	*CIMMYT	Free
Maize	ZM401	*CIMMYT	Free
Cowpeas	CBC2	**Crop Breeding Institute	\$4.00
Cowpeas	CBC3	**Crop Breeding Institute	\$4.00
Sugar beans	Gloria	**Crop Breeding Institute	\$4.00
Sugar beans	Nua45	**Crop Breeding Institute	\$4.00
Groundnuts	Jesa	**Crop Breeding Institute	\$4.00

*Material from CIMMYT was free, ** All material from the Crop Breeding Institute was procured at a cost to the farmers.

of all farmers producing a seed variety was inspected randomly.

Harvesting and transportation of seed for processing. Agritex staff conducted pre-harvest inspections at maturity and ensured moisture content was below 20% at harvest as recommended by the Seed Services Unit. At this stage, off-types were removed from the seed crop. The off-types were removed based on visible differences from the rest of the crop. Delayed maturity or very fast maturity compared to the rest of the crop indicated potential genetic differences. The plants which were considered off-types were removed, a process called “rouging”.

Farmers were trained on how to separate soiled or rotten seed from clean seed. They were advised to harvest seed into two separate categories; totally clean seed and seed that needed further cleaning. This was to reduce the effort that would be required in sorting the seed and grading later after shelling or threshing. The harvested seed was also kept separate from any other grain to maintain purity.

When all farmers had completed preliminary seed processing, the extension staff inspected seed for purity. Any visibly impure seed was not allowed to leave the farm so as to avoid having to transport such seed back to the farmer for further grading. The bags containing the seed were labelled with the details of each farmer, variety of seed and location of the farm. The labels were in duplicate with one attached outside the bag and the other placed inside the bag. At the collection points the driver and the

farmers signed goods dispatched and goods received vouchers which were in duplicate allowing both parties to retain copies.

Transporters for the seed were organised to collect seed from pre-determined collection points chosen for centrality and easy access by the majority of the farmers. The seed was weighed on-site and the mass entered into a duplicate book. A copy remained at each ward while the other copy was forwarded to the warehouse where seed was delivered. No labour was hired as farmers did the loading. The seed was offloaded at the warehouse by employed staff who immediately conducted purity analysis for the seed before it was accepted.

RESULTS

Production level and number of farmers. Seed production of cowpeas, sugar beans, rice, maize and groundnuts was undertaken by 454 farmers from 10 wards of Zaka for three consecutive cropping seasons; 2011/12, 2012/2013 (Table 3) and 2013/2014. The farmers were composed of 94% communal smallholder and 6% resettlement farmers. Six farmers (1.3% of total) failed certification, during the first season of seed production, due to wrong isolation distances and poor weed control. Four of the six failed at field inspection while the other two failed due to poor quality seed in terms of physical purity, after harvest. Seed samples tested by Seed Services according to the Seed Certification Scheme of Zimbabwe (2000), all exceeded the minimum acceptable purity and germination standards (Tables 4-6)

Table 3. The number of participating farmers in Zaka district in 2012

Seed crops grown	Number of farmers		
	Male	Female	Total
Maize	19	18	27
Maize and sorghum	18	11	25
Maize	11	19	30
Cowpeas	52	82	134
Sugar beans	29	21	50
maize	16	16	28
Rice	31	25	60
Groundnuts	21	29	50
Groundnuts	25	11	50
Total	222	232	454

A compelling case for seed enterprises as a tool for rural development

Table 4. The quality of seed produced by Zaka Super Seeds in 2011/2012 based on 20 samples of each crop varieties tested by Seed Services

Crop	Variety	Average germination (%)	Minimum accepted (%)	Purity (%) average	Minimum accepted (%)
Maize	ZM309	95	90	100	99
	ZM401	93	90	99.5	99
Sugar beans	NUA45	90	80	99	99
	Gloria	91	80	99.5	99
Cowpeas	CBC2	90	80	100	99
	CBC3	88	80	99.8	99

Table 5. The quality of seed produced by Zaka Super Seeds in 2012/2013 based on 20 samples of each crop varieties tested by Seed Services

Crop	Variety	Average germination (%)	Minimum accepted (%)	Average Purity (%)	Minimum accepted (%)
Maize	ZM309	95	90	100	99
	ZM401	94	90	100	99
S.beans	NUA45	90	80	99	99
	Gloria	91	80	100	99
Cowpeas	CBC2	97	80	100	99
	CBC3	97	80	100	99

Table 6: Quality of seed produced by Zaka Super Seeds in 2013/2014 based on 25 samples of each crop varieties tested by Seed Services

Crop	Variety	Average germination (%)	Minimum accepted (%)	Purity (%) average	Minimum accepted (%)
Maize	ZM309	95	90	100	99
	ZM521	97	90	100	99
	ZM401	94	90	99.9	99
Sugar beans	NUA45	98	80	100	99
	Gloria	95	80	100	99
Cowpeas	CBC2	97	80	100	99
	CBC3	96	80	100	99

The area allocated to crops which had a good demand on the market was increased in subsequent years. Groundnuts, rice and sorghum had virtually no market demand and hence production was reduced in successive seasons. The total value of seed purchased from farmers by Zaka Super Seeds increased 4.7 times over three seasons, whereas that of seed sold by the seed company increased 5.3-fold over the same period (Table 7).

Seed production by Zaka Super Seeds rose from 26.5 MT in 2011/12 to 51.8 MT in 2012/13 and to 151 MT in the 2013/14 season. Area planted to seed rose from 782 ha in 2011/12, to 1690 ha in 2012/2013

and to 4880 ha in 2013/2014.

Processing and packaging of seed. All seed that failed purity tests was rejected and further processing terminated. Seed that failed because of grading was re-graded by the affected farmers. Seed that had insect damage and/or was rotten was rejected outright. Testing criteria included physical purity, damaged seed, inert material, insect damaged, broken seed, other crop seed and weed seed (Certification scheme, 2000). When purity was acceptable, seed samples were tested for germination in a mini-laboratory developed for the processing sites. Farmers who had joined the seed production

enterprise from within the target ward were all invited for training on germination and purity tests. Twenty-five people made up of 21 farmers and four extension staff were trained by the Seed Services staff on how to use the field seed testing laboratory. An option was to send samples to the Harare Seed Services laboratory and await the results. The on-site mini-laboratory carried out all the tests possible under ambient room conditions with temperature ranging from 16 to 25°C. No samples passed by the field mini-laboratory ever failed any tests when they

were finally blind-tested by Seed Services.

The processing equipment and plant set up. A premise to use as the processing plant was provided by the Department of Irrigation under the Ministry of Agriculture, Mechanisation and Irrigation Development in the form of a disused shed at Fuve-Panganayi Irrigation Scheme in Ward 15 of Zaka district. The dilapidated shed was renovated with SDC support through FARNPAN. After the renovations, seed handling and processing equipment

Table 7. Zaka Super seed transactions from 2011/12 to 2013/14 cropping seasons

Crop	Variety	2011/12 Value (US\$)		2012/13 Value (US\$)		2013/14 Value (US\$)	
		Purchase	*Selling	Purchase	Selling	Purchase	Selling
Maize	ZM 309	2802	5837.5	5514.6	11488.75	1800	37500
	ZM 401	5400	11250	13590.6	28313.75	28980	60375
	ZM 521	*	*	*	*	5400	11250
	Subtotal	8202	17087.5	19105.2	39802.5	36180	109125
Cowpeas	CBC2	700	875	1463	2612.5	9660	17250
	CBC3	1820	3250	2093	3737.5	5600	10000
	Subtotal	2520	4125	3556	6350	15260	27250
Beans	NUA 45 Certified	7000	12500	7851.2	14020	26600	47500
	NUA 45 Foundation	*	*	1219.4	2177.5	4200	7500
	GLORIA Certified	3500	6250	9857.4	17602.5	24920	44500
	GLORIA Foundation	*	*	854	1525	3360	6000
	Subtotal	10500	18750	19782	35325.25	59080	105500
Rice	NERICA 7	1500	4000	594.75	952	*	*
Groundnuts	Jesa	440	935	*	*	*	*
Sorghum	SV4	250	500	*	*	*	*
Gross		23412	45397	43037.95	82429.75	110520	241875

* = crop was not grown in that season; **Purchase value refers to the price paid to seed growing farmers; ***The selling value is the price the processed seed was sold at to buyers of certified seed.

Table 8. Equipment procured and used by Zaka Super Seeds at inception in 2011

Equipment type	Quantity	Condition
Seed Treater –revolving drum	1	New
Seed grader	1	New
Manual electric heat sealers	2	New
Electronic scales up to 20kg	5	New
Electronic scale up to 150 kg	3	New
Desk	2	New
Chair swivel	1	Second hand
Easy everywhere chair	4	Good
Volumetric bag off machine	1	New
Bag closer sewing machine	1	New
HP Laptop	1	New
HP Laser Jet Printer P1102	1	New
Book Shelf	1	Good second hand
Truck T35 capacity 3.5t	1	Good second hand

A compelling case for seed enterprises as a tool for rural development

was procured, mainly from Dichwe Implements and Precision Grinders located in Harare (Table 8). As soon as the equipment was installed, hands-on training commenced. All the seed delivered to the warehouse was fumigated using aluminium phosphide (57% active ingredient (a.i)) at 10 g/tonne to kill all insects.

Seed treatment. Seed was dyed uniformly and treated with insecticides, fungicides and a micronutrient. For maize seed, Captan 50 Sc (50 % a.i) (fungicide), Super Guard 50 EC (a combination of the insecticides pirimiphos methyl at 400 g/L and pemethrin at 75g/L) and sodium molybdate (a micronutrient to enhances germination) were used. The fungicide was applied first, followed by the grain protectant and then the dye to give a distinctive brand colour. For legume seed, the fungicide Thiram (80% WP) at 60g/50kg seed and Super Guard at 5 ml/50 kg seed were used. After mixing in a revolving drum mixer, the seed was left to lose moisture for a day in open polypropylene bags before packaging. The seed was packaged using the volumetric bag-off machine or manually packed in 2 kg, 5 kg and 10 kg plastic bags. The seed was weighed manually to match the pack sizes. On the bag-off machine, seed was automatically weighed and packed. After packing, plastic bags were sealed with a heat-sealer and polypropylene 50 kg bags were sawn.

Marketing and distribution network development

The marketing plans and strategies were developed during brainstorming sessions by the district committee and a seed business specialist from CIMMYT. Strategies and plans were only put in place after the participants in the meetings agreed on the best course of action for the seed business.

Pricing. Pricing of the seed was based on a cost-plus method. The costs incurred by farmers during the whole seed production process were factored in and an agreed profit margin added. This margin was acceptable to the seed growers' association district

committee. The costs included in the price were labour, ploughing, planting, weeding, chemicals applied, packaging and transportation. The price calculations were done by the district committee members in the presence of representatives from each ward. The model was then agreed to by farmers in each ward. The involvement of farmers was done to encourage transparency. In addition, GRM and Agritex extension staff studied the market to determine how much competitors were charging. Table 9 shows the seed prices paid to farmers for the three seasons. The farmers benefited more from growing seed compared to food crop production (Table 9).

Distribution network. In the first season (2011/12), seed was distributed to ward committees and 20 agro dealers in Zaka district. The SAMP Harare office was used as a distribution point to cater for visitors to the office and all customers who required the seed around the city. Each outlet received consignment stock and paid as product was sold. This method initially worked very well as seed production was low. As production increased, the number of agro dealers was increased to 57 in Gutu, Masvingo and Zaka districts. Properly designed trading terms contracts were entered into with all agro dealers. Ward committees were still involved in seed distribution but received less volumes as the company entered into strong formal agreements. Sales points were established with reputable businesses in Chiredzi district and Birchenough Bridge (Chimanimani district) to increase market presence of the company products. The distribution network development is still in progress for Zaka Super Seeds as contracts with nationwide sales outlets like Farm and City, Mascho and various supermarket chains are being pursued.

Marketing Strategy. The main focus for Zaka Super Seeds was initially to develop the local market in Zaka ahead of other areas. The main thrust was to fill the gap that mainstream seed companies ignored,

Table 9. Seed producer prices paid to farmers by Zaka Super Seeds from 2011 to 2014

Crop type	Seed price (US\$/per/Mt)	Grain price(US\$/Mt)
Seed maize OPV	600.00	295.00
Cowpeas	700.00	500.00
Sugar beans	1400.00	1200.00
Sorghum	500.00	250.00
Rice	750.00	500.00
Groundnuts	900.00	850.00

hence the focus on certified seed of cowpeas, sugar bean and other minor crops. The maize seed market was penetrated through provision of very short duration maize varieties with high drought tolerance matching the environmental conditions in Zaka. Zaka Super Seeds organised field days in every ward where there was a committee in place. The field days were aimed at sensitising the communities about the products and assured farmers that the seed was of high quality. Field days were conducted at the vegetative and harvesting growth stages to allow farmers to appreciate the advantages of the varieties. Zaka Super Seeds sponsored district trophies for crop production and these were awarded at organized functions.

Demonstration plots were planted in each ward and each ward had a mandate to conduct a small field day. At such occasions, products were marketed to all the farmers. Billboards and flyers were prepared and placed in strategic places. Flyers were distributed at field days and in agro dealer shops. Website advertising raised enquiries from beyond the borders of Zimbabwe.

Word of mouth by committee members was one of the strongest methods employed. All committee members were made aware of the unique selling points of all the products that Zaka Super Seeds sold.

A highly efficient distribution and redistribution system was developed to maximise sales and minimize costs. As soon as seed was processed, all contracted agro dealers and sales outlets were supplied. Constant monitoring of the seed stock at the sales outlets was done to verify sales of various pack sizes. In the event that certain pack sizes were sold fast in one area while stagnant in the other, stock transfers were quickly done.

Challenges faced. Foundation seed to use in the production of certified seed was in short supply for cowpeas, groundnuts, sugar beans and sorghum. Foundation seed challenges were also faced by community seed enterprises in Uganda (Mastenbroek, 2013). Consequently, Zaka Super Seeds started producing its own foundation seed of cowpeas and sugar beans. The seed security assessment conducted in 2009 also indicated that there was a shortage of foundation seed for crops like groundnuts, cowpeas, sorghum, pearl and finger millet (CIAT *et al.*, 2009).

The low level of literacy of some farmers made it difficult to train them to perform complex functions such as running the community business. The Zaka Seed Growers Association resolved this by hiring a qualified accountant to manage the finances.

Small landholdings made it difficult to achieve the required isolation distances especially for maize seed production. The feasibility of using distance isolation was problematic hence most farmers had to resort to time isolation which meant the prime growing time for crops could be lost as they waited for neighbours to finish planting first. The scattered nature of the growers' fields increased labour demand for inspections. Some of the fields were only accessible on foot which slowed down the inspection process. The drought-prone district of Zaka made consumption and side-marketing of harvested seed highly tempting, especially for seed legumes.

All the services required from the Government of Zimbabwe and partner departments were centralised in Harare which is 350 km away from Zaka district. It was costly to transport and accommodate inspectors. Seed samples for testing were transported from Zaka to Harare for purity and germination tests. The costs involved and the time reduced efficiency of the enterprise.

DISCUSSION

There was an increase in the area under seed production, indicating that community seed businesses have capacity to increase access to seed by farmers and this was also experienced in Cameroon (Guei *et al.*, 2011) and other countries. According to Langyintuo *et al.* (2010), community-based organisations (CBOs) contribute only 4% of the regional seed trade in southern Africa, which reflects very low activity. The fact that Zaka Super Seeds failed to access sufficient quantities of foundation seed concurs with findings by CIAT *et al.* (2009) and Langyintuo *et al.* (2010). In Zimbabwe, seed of crops such as bambara nuts and groundnuts are in short supply and their availability can be increased by community seed businesses. The popularity of seed from CBOs enterprises can be attributed to the full participation of local farmers and agricultural experts such as researchers and extension specialists who have local knowledge of ideal varieties grown in a particular area (Sperling and McGuire, 2010). While Tripp and Rohrbach (2001) had reservations on community seed production by farmers, the Zaka

Super Seeds model was different from most in that it was run on commercial lines and farmers realized their income as individuals based on production of professionally quality-assessed seed. The model had the sustainability focus as proposed by Mastenbroek (2013) for community seed businesses. Zaka Super Seeds is managed by a competent secretariat of technical people employed by the community seed enterprise. Seed certification was done to comply with commercial standards so that the seed could be sold in formal distribution channels.

The use of local ward committees to market and conduct seed sales increased sales due to family ties in communities. Rubygo *et al.* (2009) found that seed interchange between families and neighbours in East, Central and Southern Africa accounted for 71% of all seed of self-pollinated crops. This showed that community links strengthen seed relationships easily compared to external sources. The active involvement in decision-making by farmers, through committees, ensured that farmers accessed varieties of their preferred crops and that such varieties were more adapted to the farmers' growing environment. FAO (2004), recommended a model in which farmers' seed systems, perceptions and choices are given importance. The fact that Zaka Super Seeds was developed and supported by key stakeholders like the Government of Zimbabwe's Seeds Services, and extension services (Agritex) and CIMMYT, is important and resonates with recommendations by Rubygo *et al.* (2009). The partners which supported Zaka Super Seeds were also contacts for marketing products. This increased visibility. The exclusion of partners and experts in seed-aid was cited as one reason for failure to address farmer needs (Sperling and McGuire, 2010). The SAMP project, in contrast, involved as many stakeholders within reasonable reach as possible, including the farmers. A similar approach was used by CIAT in Uganda in farmers' seed enterprises (David, 2004).

The increase in volume of seed produced by farmers in Zaka from 26 MT to 151 MT showed a shift in land use. Commodity crop production was being reduced by all farmers who were involved in seed production. This may be an advantage for the seed business if the farmers grow seed only as this reduces possible mixing of seed with grain. The seed farmers would then use income from seed sales to purchase grain for food. The number of farmers who failed certification did not exceed 3% in any of the three operational years. The thorough technical training

that farmers received from extension staff could have increased the ability of farmers to produce quality seed. The low failure rate shows that smallholder farmers have capacity to produce certified seed and increase quality seed supply.

Farmers also realised increased income as a result of involvement in seed production. The income increased since seed pays better than produce for food consumption. For example OPV maize seed was purchased from the farmers by Zaka Super Seeds at a price 203% higher than for grain. Local seed availability also contributed towards increased yield as a result of timely planting of food crops since well-adapted seed was available early in agro-dealer shops compared to that supplied from outside the area. The crops yielded more and sales of commodity increased. The seed sold increased income which increased the variety of food purchased for the household by farmers, contributing towards improved food and nutrition security. The involvement of communities as active participants in policy and decision-making increased ownership by farmers and perhaps, sustainability even when donor funds dry up. Victoria Seeds in Uganda provide a ready market for the seed produced by farmers which is also the case with Zaka Super Seeds; hence there is scope for continued growth of the enterprise.

CONCLUSIONS AND RECOMMENDATIONS

Correct pricing and good management makes a community seed enterprise sustainable as it can sell seed to the local and external community at a profit. A community-owned seed business has capacity to supply seed that is normally in short supply such as in the case of sugar beans, cowpeas, rice, finger millet and bambara nut. This study demonstrated that smallholder farmers have the capacity to produce high quality seed that can pass certification standards. Producing certified seed increases farmers' income compared to commodity production.

For smallholder farmers, land size is a limiting factor in seed production especially where isolation distances are mandatory. In addition, the requirement by seed laws for sole crops is also an important limitation. However, seed can be isolated by time, especially where irrigation facilities are available like in the Fuve Panganayi Irrigation Scheme in Zaka district of Zimbabwe.

It is our assertion that seed production by smallholder farmers should be supported through enabling

policies and can contribute towards increased food and nutrition security. Farmers will have increased access to quality seed of crops they prefer. Selecting farmers that demonstrate high integrity and skill could reduce cases of low yields, poor crop management and side marketing.

Decentralisation of seed inspection and laboratory services in a country is essential and it is an area that needs to be critically reviewed as all seed samples are normally sent to a central laboratory for testing. This means community businesses have to pay for transport and accommodation for inspectors from far off and this reduces profit margins and efficiency. Foundation seed supply is another bottleneck and this can be resolved through supervised production of foundation seed.

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STATEMENT OF NO CONFLICT OF INTEREST

We the authors of this paper hereby declare that there are no competing interests in this publication.

REFERENCES

- Anonymous, 2010. Baseline Survey Report for SAMP project. Harare, Zimbabwe
- Anonymous, 2011. GRM report. Monitoring and Evaluation System, May 2011. Seeds and Markets Project (SAMP), Harare, Zimbabwe.
- CIAT, CRS, CARE, World Vision, FAO, Agritex, USAID, CIMMYT, and SOFECSA. 2009. Seed System Security Assessment in Zimbabwe. An assessment funded to the United States Agency for International Development/Office of Foreign Disaster Assistance. Rome.
- David, S. 2004. Farmer seed enterprises: a sustainable approach to seed delivery? *Agriculture and Human Values* 21 (4): 387-397.
- Dawes, M., Murota, R., Jera, R., Masara, C. and Sola, P. 2009. Inventory of smallholder contract farming practices in Zimbabwe. A research report for SNV. SNV. Harare.
- Food and Agriculture Organisation (FAO). 2010. Promoting the growth and development of smallholder seed enterprises for food security crops: Case studies from Brazil, Côte d'Ivoire and India. AGP Series 201. Rome: Food and Agriculture Organization of the United Nations. www.fao.org/docrep/013/i1839e/i1839e00.pdf.
- Food and Agriculture Organisation (FAO). 2004. Towards effective and sustainable seed relief activities. In: Sperling, L. Osborn, T. and Cooper, D. (Eds.), Report of the Workshop on Effective and Sustainable Seed Relief Activities, Rome, 26–28 May 2003. FAO Plant Production and Protection Paper: 181.
- Foti, R., Muringai, V., Mavunganidze, Z. and Mlambo, N. 2007. Seed aid for food security? Some lessons from Zimbabwe's agricultural recovery programme. *International NGO Journal* 2 (6): 131-135.
- Guei, R.G., Barra, A. and Silue', D. 2011. Promoting smallholder seed enterprises: quality seed production of rice, maize, sorghum and millet in northern Cameroon. *International Journal of Agricultural Sustainability* 9(1): 91-99.
- International Fund for Agricultural Development (IFAD). 2011. Rural Poverty Report. Rome, Italy. <http://www.unwomen.org/en/docs/2010/1/rural-poverty-report-2011> Accessed February 7, 2017.
- Langyintuo, A.S., Mwangi, W., Diallo, A.O., MacRobert, J., Dixon, J. and Bänziger, M. 2010. Challenges of the maize seed industry in eastern and southern Africa: A compelling case for private-public intervention to promote growth. *Food Policy* 35: 323–331.
- Langyintuo, A.S. and Setimela, P.S. 2009. Assessing the effectiveness of a technical assistance program: The case of maize seed relief to vulnerable households in Zimbabwe. *Food Policy* 34 (4): 377-387.
- Malcom, B. 2016. Tying it together: global, regional and local integration. In: Snapp, S. and Pound, B. (Eds.), *Agricultural Systems: agroecology and rural innovation for development*, Amsterdam: Elsevier 2nd ed, 2016
- Maredia, M., Howard, J., Boughton, D., Naseen, A., Wanzala, M. and Kajisa, K. 1999. Increasing seed system efficiency in Africa: Concepts, strategies and issues. MSU International Development Working Paper. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan, USA.

A compelling case for seed enterprises as a tool for rural development

- Available at: <http://ageconsearch.umn.edu/bitstream/54578/2/idwp77.pdf> (accessed 7 Feb. 17).
- Mastenbroek, A. 2013. A local seed business in Uganda: a market-oriented approach towards community seed production. A paper presented in an expert consultation on community seed production jointly organized by FAO, ICRISAT, ICARDA, CIAT and CRS; 9-11 December 2013, Addis Ababa, Ethiopia
- NASFAM, 2016. NASFAM Associations on track to attaining financial independence <http://nasfam.org/index.php/news-info>. Accessed November 2016
- Rohrbach, D. D., Low, J., Cucu, A., Massingue, J., Boughton, D., Rafael, G., Paulo, A. and Jocene, D. 2001. Investment priorities for the development of Mozambique's seed system. Research Report No 44E. Directorate of Economics Research Paper Series.: Ministry of Agriculture and Rural Development, Maputo, Mozambique.
- Rubyogo, J.C., Sperling, L., Nasirumbi, L. and Kasambala, S. 2009. Developing seed systems with and for the marginalised: case of common beans (*Phaseolous vulgaris* L.) in East, Central and Southern Africa. Developing Seed Systems in Africa. 451pp. In: Scoones, I. and Thompson, J. (Eds.). Farmer First Revisited. Practical Action Publishing Ltd. Warwickshire, UK.
- Sperling, L. and McGuire, S.J. 2010. Persistent myths about emergency seed aid. *Food Policy* 35 (3): 195–201.
- Tripp, R., Walker, D.J., Miti, F., Mukumbuta, S. and Zulu, M.S. 1998. Seed management by smallscale farmers in Zambia. A study of cowpea, groundnut and sorghum seed in the southern and western provinces (NRI Bulletin 76). [Working Paper] Available at: <http://gala.gre.ac.uk/11101>