



TECHNOSERVE
BUSINESS SOLUTIONS TO POVERTY



The Small Commercial Farmer model as a mechanism for rural development





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ACRONYMNS

AGRA	Alliance for a Green Revolution in Africa	SBS	Sociedade de Beneficiamento de Sementes
COPAZA	Cooperativa de Produtores de Alta Zambézia	SDAP	Sociedade de Desenvolvimento Agropecuário
MZN	Mozambican metical	USD	United States dollar



Small Commercial Farmer model

Smallholder farmers, typically defined as farmers with less than 5 hectares of land, almost universally lack access to improved inputs, mechanized farming equipment, technical skills, and markets. Most conventional solutions fail to connect participatively with smallholders, or are geared to delivering public goods in ways that are inherently unsustainable. Private sector companies who may want to enter local, rural markets are often too risk-averse to invest in last-mile distribution networks and credit schemes to reach smallholder farmers. As a result, key actors have turned their attention to seeking models that bridge the “missing middle” by combining private sector incentives, credit mobilization and market agency by local farmers themselves to change the dynamics.

One such attempt is the Small Commercial Farmer model developed by TechnoServe in 2012. In this model, small commercial farmers are leading local farmers and entrepreneurs with the ability to adopt and mobilize improved agricultural techniques and technologies that will increase their own production and, subsequently, that of the community. Small commercial farmer candidates are selected for their farming history, behavioral traits indicating entrepreneurial capacity,

access to viable tracts of land, capital to invest and their expressed desire to invest in this new business model.

The clients of the small commercial farmers are neighboring smallholder farmers. The small commercial farmers sell mechanization services (tractors and threshers), inputs (primarily seed), and transfer knowledge on best farming practices to these smallholder clients. In addition, small commercial farmers play an aggregation role, buying back produce from these smallholder farmers and forward-selling to large commercial farmers or other agribusinesses.

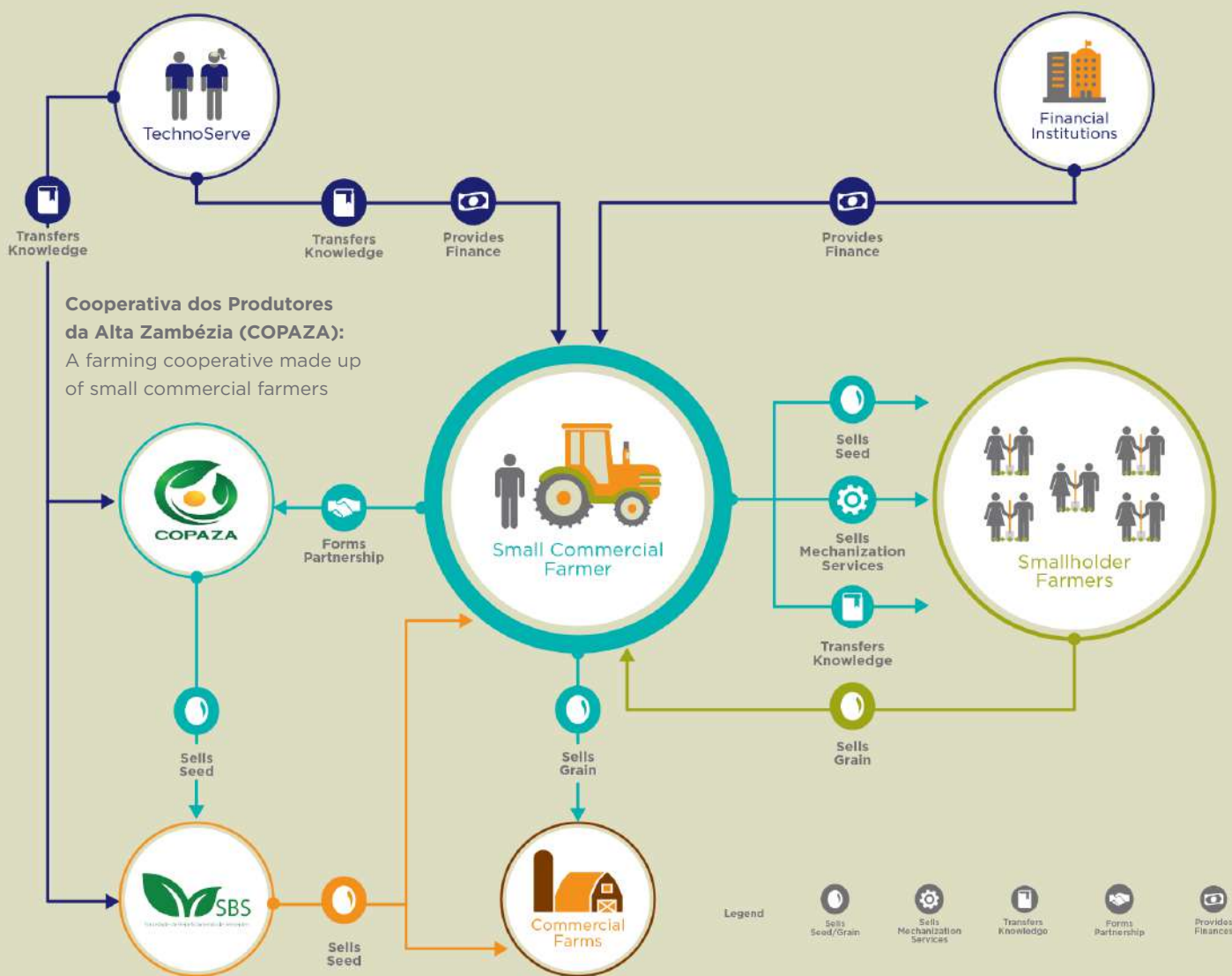
The model aims to be sustainable through the small commercial farmer developing a profitable business model based sales of inputs and services to neighboring smallholder farmers as well as to larger agribusinesses and traders, who act as the primary off-takers of the small commercial farmers’ product. These small commercial farmers are organized into a farming cooperative, where they are able to have a united approach to the commercialization of their product, thus giving them leverage to negotiate for better prices.



Objectives

The objectives of the Small Commercial Farmer model are:

- 1 To create a class of small commercial farmers by empowering selected smallholder farmers with access to mechanization, inputs and improved farming techniques in order to increase their own production and become seed multipliers
- 2 To use this network of small commercial farmers to sustainably reach smallholders with services, inputs and knowledge so that they can increase their own production and incomes



Sociedade de Beneficiamento de Sementes (SBS):
A seed company and processing plant

Developing the model

Alta Zambézia, a region in the northern Mozambican province of Zambézia that is known for its fertile soils and good agro-climatic conditions, is home to more than 10,000 smallholder farmers and small commercial farmers. While the region has seen improvements in agricultural production over the past few decades, there is much progress to be made. In order to increase productivity, farmers in the Alta Zambézia region

needed access to improved seed, mechanization, markets, and knowledge about good agricultural practices. As such, the Alta Zambézia region was selected as a optimal location for the piloting of the model, through which TechnoServe identified and empowered 33 small commercial farmers over the course of six years to benefit thousands of smallholder farmers.

Key elements of the Small Commercial Farmer model

Locally-based	Farmers selected from within communities, and have trust-based relationships with others farmers	Wide range of services	Farmers provide seed and other inputs, aggregation, mechanization services, in-kind credit
Family business	Role model for “farming as a family business”; successfully engages women and youth in household	Bankable	Farmers are large enough to have access to formal finance; average USD \$40,000 loan size with commercial banks using own equipment as collateral in a leasing arrangement
Medium-sized farming business	Farmers are credible and influential due to own success, and large enough to partner with big agribusinesses	Sustainable and scalable	Profitable businesses that are not dependent on donor support to maintain operations so can be replicated
Organized cooperative	Farmer cooperative negotiates with buyers and has shares in seed processing plant		

TechnoServe’s work to empower small commercial farmers:

Selection	Business formalization	Financing	Seed multiplication training	Mechanized equipment training
Initial outreach and selection of high potential candidates based on clear criteria and long process of getting to know the farmers	Support to register and license each farmer’s business (as needed), including acquiring rights to use land	Support for farmer to finance the acquisition of mechanized equipment, including negotiations with banks for commercial loans and support restructuring loans	Training of farmers on technical soy seed production methods, including mandatory practices for seed multiplication required for approval and certification of fields by National Seed Authority	Training of farmers on use of tractor and its accessories as well as thresher machines, including operation and maintenance training



Why soybean?

The leap from smallholder farmer to small commercial farmer requires a reliable cash crop. Soybean is a high value and profitable crop with a rising demand that is used for two main by-products, soy cake and soy oil, which, respectively, account for about two thirds and one third of the crop's economic value. Whereas soy cake is used as feed in the country's booming poultry industry, soy oil is largely for export with some domestic utilization. Until recently, however, Mozambique had low demand for soybean and therefore low production. Rapid growth in the poultry industry boosted the demand for soybean, and in turn the domestic production. This has ensured that, unlike many other food crops, the price for soybean has remained relatively stable. Soybeans grow well in the rich soils of the Alta Zambezia region. With adequate training on appropriate planting practices and inputs, soybeans can provide a steady revenue stream for a farmer looking to grow his/her business.

Business training

Training of farmers on business management skills, including development of tailored business plans for each farmer

Demonstration plots

Support for farmer to develop demonstration plots on their own land and host field days to transfer knowledge to smallholder farmers

Farmers cooperative

Organization of the farmers into the cooperative, COPAZA, and formal registration of the cooperative

Market linkages

Support to establish a joint venture along with a private partner to create a seed processing facility; Support to build connections with seed multiplication companies to contract out seed multiplication services

Why seed multiplication?

The use of traditional grain seed rather than higher quality, improved certified seeds continues to be a trend for much of the Alta Zambézia region. Based on TechnoServe's experience, 10% of seed in Mozambique is produced through formal seed production and 90% is from poor quality, recycled seed. For soybean production, as with most crops, the type of seed used can have huge impacts on productivity; when a farmer uses improved seed compared to traditional grain seed, the yields are far higher. In order to combat low utilization of improved seed, TechnoServe recognized that the supply of higher quality, improved certified seeds needed to be strengthened. As such, small commercial farmers were trained to become seed multipliers, a technique that requires more agronomic expertise. Equipped with the knowledge of how to grow certifiable seed, these small commercial farmers contributed to the increase in availability for locally produced soybean seed, at an affordable price. Moreover, they were able to increase their own incomes, as soybean seed can get a much higher price than simple soybean grain.



What differentiates a small commercial farmer from a smallholder farmer?

The differences between a small commercial farmer and a smallholder farmer may not always be evident to the casual observer—both live in rural areas and grow similar crops. However, there are important distinctions between the two.

Unlike a smallholder, a small commercial farmer:



Has a farm of at least five hectares, and the land rights that allow him/her to use it



Focuses his/her production on cash crops not consumed by his/her own family



Has a formally registered business



Has experience with and the technical ability to use mechanization and farming inputs



Has a bank account and access to formal finance



Has the capacity and willingness to expand his/her farm with the proper support



Demonstrates the vision and motivation necessary to expand his/her business

Impact of the model

By establishing local-level capabilities for diffusing improved technologies and techniques to other local farmers, the Small Commercial Farmer model has successfully impacted small commercial farmers and smallholder farmers alike.

Small commercial farmers as profitable commercial businesses

Since 2012, the 31 small commercial farmers increased their production and incomes, largely through expansion of their land area though also through better production techniques leading to higher yields. They have grown their businesses, not only through their increased farming capacity but by diversifying through adding sales of inputs and services.

In 2017-2018, small commercial farmers prepared 2,640 hectares of land, including 732 hectares of smallholder land. They have increased their farm size by 675 hectares in total, or 20.45 hectares per farmer and increased their soybean grain production by 22,972 kg in total or 696 kg per farmer. Moreover, they have **increased the availability of soybean seed in the region through combined production of 326,395 kg of certified seed (from zero production in 2012).**

In 2017-2018, the average revenue across all small commercial farmers was over USD \$11,000, including USD \$2,300 from renting equipment, with a gross profit of \$4,500. In fact, the **highest performing small commercial farmers have achieved over USD \$30,000 revenues and USD \$13,000 gross profit in 2017-2018, providing a strong business case for being a small commercial farmer.**

Impact of small commercial farmers on smallholder farmers

Over the last 5 years, the number of smallholder farmers reached by small commercial farmers through mechanized services, input sales and knowledge transfer has **tripled from around 1,000 to over 3,000 smallholder farmers.**

Additionally, the area of land used for soybean production by smallholder farmers has almost doubled. In the 2013/ 14 season, only 0.6 hectares of soybean were produced per farmer but by 2017/18 that has **reached 1.07 hectares of soybean produced per farmer.**

Smallholder farmers reached by small commercial farmers use significantly more inputs than other smallholder farmers, particularly seed, pesticide, inoculant, irrigation and mechanization services. This change is significant in terms of mechanization services; **61% of smallholder farmers reached by small commercial farmers use tractors or threshers, compared to only 16% of other smallholders.**

Most importantly, smallholder farmers reached by small commercial farmers overall yields are higher than those of a control group of smallholder farmers not reached by small commercial farmers.

In 2017/18, smallholder farmers reached by small commercial farmers were getting yields on average of 1.06 tons per hectare compared to 0.86 tons per hectare by other smallholders, which amounted to a difference of around MZN 4,000 (USD \$64) in overall revenue. Smallholder farmers reached by small commercial farmers saw an increase in gross profits of MZN 3,000 (~USD \$48) per year.

33

small commercial farmers since 2012

326 tons

in the production of certified seed available in the region

3,000

smallholder farmers reached by small commercial farmers

1.06 tons

yields per hectare by smallholder farmers in 2017-2018

USD \$30K

in revenues by the highest performing small commercial farmers in 2017-2018

USD \$13K

in gross profit by the highest performing small commercial farmers in 2017-2018

61%

smallholder farmers reached by small commercial farmers use tractors/threshers

MZN 3,000

in gross profit by smallholder farmers reached by small commercial farmers in 2017-2018

Stories from the field

Xavier de Almeida becomes a small commercial farmer

Xavier de Almeida's 73 hectares of lush, green soybean plants is nothing if not impressive. Grown on rich farmland he hacked out of the wilderness one stubborn tree trunk at a time, Almeida's soybean plantation has made him one of the wealthiest farmers in Alta Zambézia. His success—and that of the smaller farmers around him—offers striking evidence for how mechanization, market access and the spread of knowledge can help increase agricultural production, and improve the lives of those who depend upon it.

When TechnoServe first began looking for small commercial farmers with the potential to grow improved soybean seed and spread new agricultural techniques within their communities, Almeida appeared to be an ideal candidate. Before 2015 he was a part-time farmer, preferring to focus his energy on his transport business. He had heard of soybean, but had never thought of growing it himself. But his drive and business acumen made him stand out.

According to TechnoServe's Ivan Motany, one of the key criteria was that farmers should have both land and the state-sanctioned right to use it. Despite being relatively new to farming, Almeida already owned a 30-hectare farm. "Other farmers had five or six hectares", he says. "Mine was the largest." When he heard about the opportunity to work with TechnoServe, he immediately acquired the land rights to a substantially bigger

"They started growing soybean when they came to watch me," he says. "I motivated a lot of people."



plot. In an area dominated by small-scale subsistence farms, Almeida's ambition to become a serious commercial farmer was evident.

The TechnoServe team began the search for prospective candidates by conducting a survey among the farmers of Alta Zambézia. This process yielded a list of around 70 farmers like Almeida, with the capacity to grow large enough to impact soybean production in their communities.

"We wanted the farmers to stop farming with their traditional methods and start developing into commercial farmers", says Motany, and the team knew this would take more than just new techniques. Plowed and harvested by hand, a soybean farm can only grow so large before it ceases to be profitable; to achieve scale requires mechanized equipment.



It was the ability to finance this equipment—mainly tractors and tractor accessories—that became the final determinant of which farmers to work with. TechnoServe was able to cover half the cost of the machines through grant funding, and negotiated favorable interest rates with local banks to finance an additional 40 percent. The remaining ten percent, an equivalent of around USD \$8,000 for all the various equipment, had to come from the farmers themselves.

Of all TechnoServe's criteria, this proved to be the most challenging. In the first year, only six of the 70 farmers identified were able to collect enough money to receive a tractor; eventually this number rose to 31. Motany says that if a farmer needed help securing land rights or formalizing his business, TechnoServe was willing to work with him. But ten per cent of the price of a tractor was something each farmer needed to secure on his own.

In this respect Almeida, with his multiple income streams, was fortunate. "It was simple", he explains. "I had that amount, I had an available farm, I had workers and was already progressing." He deposited his money and, shortly thereafter, received a brand-new tractor, the first he had ever used. He put it to work immediately, and has been steadily expanding his farm ever since.

"The tractor is a bit expensive, but it helps you plow a field that could not be tilled with a hand hoe. We're talking about 70 hectares or so—if we were doing everything manually, we could never manage it", he says.

Once a farmer got his tractor, TechnoServe worked with him on the ideal spacing, inoculants and farming techniques required to maximize soybean



production. "Soybean is very simple, easier than growing corn", Almeida says, though he admits that without training, it isn't so easy. "He who followed what we were taught made good seed, good soybean, good corn. But he who did not follow it could not do anything."

TechnoServe's primary objective was to see this knowledge trickle down to smaller farmers, and sure enough, it wasn't long before Almeida's neighbors took an interest in his new farm. "When I started clearing that field, every morning there was the noise of the machine", he remembers. "At that time nobody had more than 20 or 30 hectares. The normal farm was two hectares." But Almeida's neighbors started renting his equipment, including the tractor, and soon many had expanded the size of their own farms as well.

Seeing how profitable it was, a growing number of them also decided to try soybean. "They started growing soybean when they came to watch me", he says. "I motivated a lot of people." Almeida sold seed to other farmers on credit; for every bag of seed he gave away, he asked for two bags of grain from the eventual harvest. Occasionally, he gave

seed away as a gesture of neighborly good will. "Soybeans have helped a lot of people", he insists.

He himself is proof that with the right seed, equipment and techniques, soybeans can be a transformative crop. When he started growing it, Almeida says, "that's when everyone started calling me a farmer, not a trucker. Today I seem like I've been doing it since 2000 or 1992. I'm a professional." None of this would be possible without a tractor, but he admits that "the thing with the most value is the soybean."

"The tractor helps the farmer and the soybean helps the farmer. Everything is good—doing agriculture is a good thing, making seed is very good, making grain is very good too", says Almeida. "It's all worth it."





Access to mechanization

One of the key components of the Small Commercial Farmer model is bringing mechanization to Mozambican farming communities. The time and manpower required to cultivate land in Mozambique is a major bottleneck in terms of agricultural productivity, and large farms are impossible to work entirely by hand. Lack of equipment for irrigation systems precludes cultivation of certain crops and keeps productivity low.

For most farmers buying mechanized equipment is not feasible without assistance—tractors alone can run up to USD \$40,000 which is a huge sum in rural Mozambique. Moreover, it is difficult for farmers to know where to source high quality machinery and equipment, which is mostly imported.

TechnoServe assisted with the identification and sourcing of cost-effective and appropriate machinery tailored to each small commercial farmer's need, as not every farmer eligible required every piece of equipment. Once identified, TechnoServe used a blended finance model to help the small commercial farmer purchase the equipment; TechnoServe provided 50 percent of the equipment's total value, with the farmer paying ten percent and the remaining 40 percent financed through a commercial bank loan negotiated at a favorable rate (and later re-structured in light of increased interest rates and lower soy prices).

Since 2013, TechnoServe has assisted with the acquisition of:

- 32 tractors and its accessories, including:
 - 19 planters
 - 31 plows
 - 30 harnesses
 - 29 disc harrows
 - 10 rotary tillers
- 10 irrigation systems and 20 micro-irrigation systems
- 38 threshing machines (20 to women and 18 to men)

Following the delivery of the equipment, TechnoServe offered training for the small commercial farmers on proper operation and maintenance of the various equipment, in particular the tractor and threshing machines. TechnoServe also trained the small commercial farmers on skills for running the mechanization services as a business, including creating business plans and making linkages to smallholder farmers to market opportunities for the sale of mechanized services.



Lessons learned

1 Improving access to finance is one of the most intensive elements of developing a small commercial farmer.

It is a time-consuming and slow process, including time to identify farmers who meet the requirements to receive a loan (i.e. no previous defaults) and allowing the farmer to get their required cash contribution. The process of structuring of the loan can be challenging, in particular, negotiating loan terms with commercial banks that are favorable to farmers, who have cash at certain times of the year and are extremely sensitive to high interest rates. The matching grant portion of the financing, which came from TechnoServe, can be used to leverage commercial bank financing for these farmers. Constant trouble-shooting of these loans, including facilitation of discussions around loan restructuring / interest rate negotiation, is necessary.

2 Smallholder farmer demand for mechanization services exists but is fragmented. Small commercial farmers need support identifying customers and scheduling services for maximum tractor usage.

However, the model needs to take into account that tractors will not be available at key points of the farming season when they are in use on owners' fields. In fact, some small commercial farmers initially resisted renting out tractors due to fears about damages on smallholder land or in transit —this was in part resolved by increasing prices to compensate for repairs. Lack of transport limits thresher rental opportunities in some cases.

3 Technical training to owners and operators of new equipment is critical. Moreover, it should be supplied by the market actor who is the provider of the equipment.

These supplier company technicians should remain available during the first 10 days after delivery to ensure operation of any machinery. Similarly, support developing realistic cost projections is important for the functioning of the business model.

4 Lack of local service providers for spare parts, maintenance and repairs is a key barrier. Agricultural equipment breaks down frequently (currently 10 threshers out of 32 are broken), particularly because they will be heavily used.

When a piece breaks or goes missing there are few options for a small commercial farmer to replace it. There is a need to boost local manufacturing in order to increase access of spare parts in the region and to have skilled mechanics in local communities.



Stories from the field

Wilson Mareta's tractor helps expand soybean production in the community

The swathe of fertile land that lies beneath Gurúè's blue mountains has been worked by Wilson Mareta's family for generations. But until recently this was a smallholder farm ringed by dense bush, growing only a small patch of corn and beans. Plowing and planting was done with a hand-held hoe, and clearing the land involved long, sweaty days spent hacking at the tough roots of tree trunks with a machete.

When Mareta inherited the family farm in 2005 it consisted of only two hectares of corn, to which he added a hectare of soybeans. He quickly found that hiring a neighbor's tractor could help him expand the land area, and soon he was planting on seven hectares.

"Renting that tractor was expensive", he explains. "I'd been spending a lot of money, and not really earning anything." It cost too much to till the fields of his dreams, fields that stretched up to the base of the mountains and grew enough soybeans to make him into a real businessman.

Then, in 2014, Mareta heard about how TechnoServe was identifying potential small commercial farmers and helping them access the finance to buy their own tractors, and he sensed an opportunity.

"Now I'm tilling the fields I wasn't able to till before, and I'm even expanding my farm. The tractor has been very helpful."



Mareta knew a tractor would change everything. He sold all his livestock to scrape together MZN 190,383 (around USD \$5,145 at the time) for his portion of the cost, accepting a grant from TechnoServe and a bank loan for the rest. By the 2015 harvest season he was the proud owner of a bright red Massey Ferguson he could use to clear, plow, plant and harvest his soybean fields.

Mareta, along with his employee responsible for driving the tractor, received training on how to operate the new machine, as well as its various attachments. Mareta was also trained on topics such as management and accounting for businesses, since he was now growing as a businessman.





Today, Mareta is growing 20 hectares of soybeans, and plans to add five more next season. “I’m seeing a difference”, he says. “Now I’m tilling the fields I wasn’t able to till before, and I’m even expanding my farm. The tractor has been very helpful.”

In a rural area like Gurúè one tractor can go a long way, and one of the primary goals of TechnoServe was for the benefits of agricultural mechanization to trickle down to smaller farmers in the community.

“When they [other farmers] pass by they see the tractor as I’m weeding my field. Whenever the tractor’s out there they come to talk to me, because they like what it’s doing”, explains Mareta. He charges MZN 4,000 (around USD \$68) to plow or plant one hectare of land, and provides his own driver for the job. Last year alone he rented his tractor to around 36 smallholder farmers, he says, and demand is growing fast.

“My tractor is very busy”, he grins. “A lot of people need it.” In fact, from what he receives in the tractor rental, he has been able to earn back the amount he paid and begin to pay off the bank loan.



Due to this vital link between small commercial farmers like Mareta and the smallholder farmers in his community, the use of tractors and other types of mechanization in Zambezia province is growing fast.

One of Mareta’s clients is João Jemussem, a neighbor growing his own three hectares of soybeans. Having spent most of his life as a subsistence farmer and small-scale trader, Jemussem took up commercial farming only five years ago, inspired by the success of Mareta’s soybean crop. But he spent his first two years doing everything by hand,

backbreaking work even on a small plot of land.

“You dig and dig until you’re tired. Your back is hurting, you’re hungry, it’s so hard!” he says. By the end of the day, “it seems like you’re dead. You say to yourself, ‘tomorrow is only worth it if I use a tractor.’”

Jemussem has been renting Mareta’s tractor for the past three years, both for plowing and for planting, and he says it’s well worth the expense. Land that once took him and his wife five days to plant is now done in a single day, and





the tractor has helped him grow his soybean farm from one to three hectares. Mechanization also means deeper plowing, he explains, which leads to better yields.

From the rental of tractors like Mareta's, smallholders in the region have been able to almost double the size of their farms on average.

For Mareta, owning a tractor comes with its own set of challenges. Spare parts can be hard to come by in rural areas disconnected to urban markets, and when his driver broke his leg this year Mareta was forced to plow his neighbors' fields himself. But tractor rental is good business, he says, and having a tractor has transformed him into one of the most prosperous farmers in the area.

As for Jemussem, the soybean business has been good enough that he plans to add another hectare next season. "I started getting good yields and income", he says. "It has so many advantages."



The importance of tractors

A tractor and its attachments—rotary tillers, disc harrows, grades, and planters—have the capacity to transform a subsistence plot into a prosperous commercial farm. By avoiding the substantial annual cost of hiring workers to prepare, plant and harvest a large farm—as well as the efforts to find that workforce which is not readily available in rural areas - a tractor allows a farmer to expand his/her farms significantly, while accomplishing these tasks faster and keeping labor costs low. When not in use, the tractor can also be rented out to other farmers, allowing them to reap the benefits of mechanization without the steep investment. But in a rural area like Alta Zambézia, owning and operating a tractor is not without its challenges. Disconnected from markets, farmers often have difficulty sourcing spare parts when their machines break down, and cannot always afford the parts they can find. The owner and tractor driver must also be trained, both in operating the tractor and in basic repairs; incorrect usage can put a machine out of commission for an entire season.



Stories from the field

Bina Sandra's thresher saves time and money for herself and neighbors

It didn't take much to convince Bina Sandra that soybeans were a valuable crop. A keen business woman, Bina and her husband, a small commercial farmer, have been growing soybeans since 2012 in the village of Ruace in northern Mozambique.

At the time of harvest, Bina and her husband allow their mature soybean plants to wither and dry, then harvest them by cutting down the stalks which are then piled together and left in the field waiting to be threshed, traditionally by women. (Note: Threshing is the process of removing the soybean grains from their pods, which are located on the stalks.)

Bina had been doing all her threshing by hand until last year, when TechnoServe helped her gain access to the financing necessary to purchase her own threshing machine. With TechnoServe paying 50 percent and 40 percent financed through a bank loan, Bina paid ten per cent (MZN 42,500, or around USD \$700) of the cost of the machine herself. And once she had the thresher her capacity to farm changed; mechanical threshing is 6.5 times faster than manual, allowing Bina to spend her time on other tasks.

Since 2013, TechnoServe has helped 20 women like Bina (and 38 soybean farmers overall) buy threshing machines in Zambezia province. In 2017 alone, these machines were rented out

“People take the machine to thresh soybean on their own farms, and they pay me.”



to nearly 300 smallholder farmers, earning extra income for their owners.

Eugenio Lumpua, a smallholder farmer in the area, began growing soybean over ten years ago while still a salaried government employee. As a supplement to his wages, he found that the extra income went a long way. “Soybean was the highest yielding crop”, he says. “With soy production, I could pay my children’s expenses at school.”

These days Lumpua is a full-time farmer with six hectares of farmland, three of which are planted with soybeans. His crops support a family of five children and two grandchildren, and he’s proud of what he has achieved. But until recently threshing the soybean crop was an arduous affair, requiring a team of four hired laborers: three men to beat the dry soybean stalks





on the ground, and one woman to collect, sift and bag the tiny white beans that burst out of the pods and rolled into the dust.

“It’s a lot of work!” says Lumpua “That was the hardest part of soybean production.” It was also painfully time consuming; producing eight to ten bags of grain a day, the threshing team took a full 18 days to finish his crop.

All this changed in 2016, when Lumpua decided to rent a threshing machine from another local farmer. With the machine and two men to operate it, he found he could thresh his entire crop in only five days. But demand for threshing machines is high in Ruace, where a number of small farmers grow soybeans and few can afford their own mechanized equipment. When Lumpua tried to rent the same machine the following year, he found there was a long waiting list.

That’s when he discovered there was



a new player in the threshing machine rental market, Bina Sandra, and Lumpua was her first customer.

“It really helps”, explains Bina. “People take the machine to thresh soybean on their own farms, and they pay me.” She has no shortage of customers; last season Bina rented the threshing machine to around 30 other farmers, who used it to thresh nearly 400 sacks of grain. She charges MZN 100 per sack (up from 85 last year), which, she says, is “good money”, enough to help pay off the bank loan she took on the machine.

But Bina isn’t the only one earning more money. Lumpua is convinced using a threshing machine has done wonders for his own bottom line, as well as that of other soybean farmers in Ruace.

“In manual threshing there are many burdens”, he explains. “You have to pay not only the day’s wage [for the threshers], but you also have to buy their food.”

Daily wages alone could drive up the cost to 100 meticals per bag, and once these expenses are factored in, he says, mechanized threshing actually ends up being cheaper for the farmer than doing it by hand. “Less time, less costs, less food . . . everything is less.”

Moreover, while the cost of threshing drops, both the quantity and the quality of the production goes up when using a machine. Lumpua believes that fewer soybeans are lost in the dirt and shrubbery and the grain itself comes out cleaner. With manual threshing, “it comes with stones, and then when you get home you have a whole other job to do just taking them out”, Lumpua explains. But in machine-threshed soybeans, “there is no dirt. Everything is improved.” Clean, high-quality grain is more likely to find a buyer, he says, and he’s now confident that he’ll have no trouble selling his soybeans at the end of the season.



“I was one of the great mobilizers in the use of machines”, grins Lumpua, who has spent the last several years talking to his neighbors about the benefits of mechanized threshing. Moving the machine between fields isn’t easy—it takes a team of strong men to carry it along Ruace’s dusty road—but he maintains that it’s worth the effort.

“There are a lot of advantages”, Lumpua insists. “All this machinery helps the farmer, and the quality of his work.”



The importance of mechanized threshing

When done manually, threshing is an extremely time-consuming and labor-intensive process; the laborers must hit the piles of stalks with wooden sticks before sifting the fallen grain into sacks. A hectare of soybeans can take over three days to thresh by hand, and yet, during the harvest season farmers must thresh their crop quickly to prevent theft and rots. As such, manual threshing can present a real bottleneck to farmers who may wish to increase their production, but cannot because of the huge time-cost during the threshing phase.



Mechanized threshing machines are much faster, allowing farm laborers to thresh a hectare of soybean within a single day; TechnoServe estimates that mechanization reduces the time required to thresh by 85%. Fewer grains are lost and the end product is cleaner, mixed with less sand and dirt. Some farmers report that due to the cost of labor, renting a thresher is also cheaper than manual threshing. However, threshing machines in rural Mozambique are few in number and high in demand. Helping farmers access threshing machines, both to use and to rent to other farmers, streamlines production while ensuring that more people are able to profit from growing a high-quality cash crop.



Access to inputs and knowledge

Another central component of the Small Commercial Farmer model is to increase access to improved inputs and to share knowledge about how to use those inputs for better agricultural production results. Perhaps the most vital input that was lacking for soybean production in the region was improved seed, and so TechnoServe first worked to increase seed production by training the small commercial farmers on seed multiplication techniques. This included training on the ten mandatory practices required by National Seed Authority in order to certify the seed production, such as proper spacing and timing of planting seeds, proper weeding, harvesting, and post-harvest techniques, and usage of inoculants.

Once the small commercial farmers were successfully established as seed multipliers and were applying the improved farming practices to their own fields, TechnoServe worked on establishing linkages with the smallholder farmers. TechnoServe supported small commercial farmers to establish demonstration plots on 1/2 hectare of their own land. On each demonstration plot, six varieties of improved soybean seed were planted, either by using the best agricultural practices (e.g. application of inoculant, planting in line, etc.) or without applying these practices.

The small commercial farmers then hosted field days several times a year, inviting neighboring smallholder farmers to come

and learn the impact of the different inputs and improved techniques. **In 2017-2018, 32 demonstration plots were planted, 13 more than in 2016-2017. Over two years, these demonstration plots showed that using improved techniques and the new varieties will yield 1.86 tons per hectare;** using new varieties but without using these techniques, will yield only 1.38 tons per hectare. This highlighted not only the differences between the varieties, but also the benefits of adopting the techniques. In 2018, over 3,000 smallholder farmers were trained during “field days” on these demonstration plots. The demonstration plots were not only good ways to transfer knowledge, but were also important for the small commercial farmer to market his/her seed and mechanization services to the smallholder farmers in attendance.



Lessons learned

1 Demand for improved seed by smallholders appears high, but adoption is lower than expected.

Smallholder farmers saw the benefits from using improved seed on the demonstration plots, and many understood the advantage to adopting this new technology. However, they are not only risk averse, they are also extremely price sensitive; even if they can see the benefits in investing in improved seed, they still might not be willing to buy it, instead preferring to re-use grain from their own previous harvests. Additional marketing activities are required to further increase not only demand, but also adoption.

2 Small commercial farmers providing seed on credit can face challenges with repayment.

One of the presumed benefits of the model was that small commercial farmers were based in the community and had relationships with the smallholder farmers, which would benefit them when it came to selling goods and services. Many small commercial farmers provided seed on credit to smallholders at the time of planting, expecting to receive a certain number of bags of harvest. However, even in these local communities, this payment scheme was often flawed, as smallholder farmers would sell to whoever gave the best price, and some small commercial farmers were left unpaid for their seed. This issue must be carefully addressed in any seed marketing system.

3 The business case for demonstration plots needs to be clear to the small commercial farmer.

Though TechnoServe assumed most of the costs to operate the demonstration plots to date, small commercial farmers had to use their own land and time to run them—costs which were not negligible to busy farmers. The sustainability of the plots depends entirely on these small commercial farmers understanding the business case; they need to see the demonstration plots as a tool for selling their goods and services as well as a way to share knowledge.



Stories from the field

Manuel Quente uses demonstration plots to teach farmers and sell seed

Farm Number 1: Quente and Sons proclaims a proud sign alongside the highway, pointing the way to a 20-hectare soybean plantation that stretches toward the mountains near Gurúè, in northern Mozambique. Its owner, Manuel Quente, says the name of his farm wasn't chosen at random. "I am number one!" he insists, at least when it comes to soybean cultivation. "I'm a renown farmer in the area."

A few years ago, Quente wasn't a farmer at all. A retired soldier looking for a new occupation, he dabbled in construction work before buying two hectares near Gurúè and trying to grow crops. "I didn't really know how to make a farm", he says. "I was planting any which way." But somehow Quente cultivated more and more land each year, and in 2015 TechnoServe identified him as a potential small commercial farmer and helped him access financing for a tractor. With the help of mechanization he quickly grew his farm to 20 hectares and began producing certified soybean seed.

But TechnoServe's work involved more than simply providing mechanized equipment to small commercial farmers like Quente; they trained the farmers on seed multiplication techniques and best practices in soybean production, for example how to properly plant or weed and how to use improved seed, inoculants and pesticides.

"Today, everyone wants to grow soybean."



For many of these farmers, says Quente, what they learned during these trainings was a revelation. "These modern techniques are new for us", he explains. "When TechnoServe came it brought the idea that the plants have to be a certain distance from each other, and everything should be uniform. No one knew this. They thought they were losing space where they did not sow seeds."

To ensure this knowledge trickled down into the community, particularly to the smallholder farmers, TechnoServe worked with each small commercial farmer to set up a demonstration plot on a half hectare of their own land to teach other farmers in the area what they had learned.





Quente's first demonstration plot was a simple affair, designed just to demonstrate the difference between improved seed and grain. Since 2016 he has been planting six varieties of soybean seed on his demonstration plots, and his eyes light up as he describes how each fares under different conditions.

On his field days, which happen several times a year to show how the crops look during different stages of production, he invites anyone with even a small plot of land to come and observe different techniques: how the seeds are sown in a line, how to weed and later, how to harvest. He gives practical demonstrations on the value of inoculants and the proper ways to use mechanized equipment such as tractors and threshers. "They are convinced that it's better with inoculant", he says. "Today, everyone wants to grow soybean."

Although his field days are well attended (over 100 farmers have attended on various days), Quente admits this wasn't always the case; not everyone was keen to learn new techniques to grow a crop they considered only mildly profitable. What helped was that Quente also became a source of improved seed,

which he grew himself and offered on credit; farmers paid him back in grain from their eventual harvest. But if they didn't learn to plant and tend the crop properly by attending his field days, explains Quente, they were less likely to pay him back, so he refused them seed. This guaranteed a steady stream of visitors to his field days, and now, he says, more and more people seem to be genuinely interested in what he's trying to teach.

Before 2015, soybeans were not a popular crop in the area. Quente's neighbor Luís Gemusse, a smallholder farmer, had tried planting them in 2005, but had given up completely when his crops failed. But curiosity drew him to Quente's first field day, and soon he found himself attending every one.

"He is my teacher", declares Gemusse, glancing fondly at the man who has taught him so much. "For example, I know that I really have to buy improved seed, not any kind of seed. I know when I use improved seed my field will come out beautifully."

Intrigued, Gemusse decided to try another soybean crop of his own



with seed from Quente, and has been gradually expanding his production each year. He was such an enthusiastic learner during the field days, in fact, that this year Quente invited him to help maintain the demonstration plot and run the field days himself.

Though these demonstration plots have been good opportunities for small commercial farmers to market their own seeds to neighbors, they also require considerable time and effort. Quente isn't sure he will continue his demonstration plot next season—he would rather





use the land to grow more soybeans, and believes that most of his community has already learned what he has to teach.

In the meantime, he has a new idea for making sure his neighbors have access to seed: a half-built shed by the side of the highway, which is soon to be a shop. Here, Quente plans to sell improved seeds, inoculants and farm tools, which, at the moment, aren't available within 25 kilometers of his farm.

Moreover, Quente is convinced the new techniques he's been demonstrating have already taken hold in the community. "People have learned enough, and can teach new people", he says. As an example, he gestures toward his neighbor, Gemusse. "He learned the techniques here, with the demonstration plot." Now, Quente laughs, "he could be passing someone's farm where people are planting tomatoes, and he's like 'ehh, you must plant in a line!'"



The importance of demonstration plots

Demonstration plots and field days are powerful mechanisms for knowledge transfer. Smallholder farmers are extremely risk-averse and are not likely to adopt new crops or practices without full confidence that they will yield better results. Most of these smallholders practice agriculture using traditional farming knowledge that has been passed down from generation to generation, despite the fact that newer techniques and technologies exist to increase productivity. In particular, in order to convince smallholders in Alta Zambézia that they should start to grow soybean, it was necessary to show how to cultivate this new crop and why it could be even more profitable. The demonstration plots were useful ways to show tangible results from the different production techniques, such as using improved seed compared to reused grain seed or planting in a line with proper spacing. The field days were also useful for small commercial farmers to promote their seed and other inputs, including mechanization services, for the smallholder farmers.



Soybean by-products for domestic consumption on the rise in local communities

Although soybean is an increasingly popular cash crop, until recently soybean by-products have been used primarily as poultry feed or processed into oil—but not for domestic consumption. However, soybeans can be used for a number of by-products for domestic consumption such as soy chunks, corn-soya blend, soy milk and soy yogurt. These soybean by-products are extremely good sources of protein and vitamin B and can be cheaper than other options, including meat which is not affordable in many rural areas.

Few households in Alta Zambézia actually ate soybean products, until recently. Since 2017, TechnoServe has been working with a cooperative of women, called Nossara, helping them develop their soymilk and soy bread sales into a more viable business.

A vibrant market for soybean products in northern Mozambique benefits soybean producers as well as the members of the cooperative, and it boosts nutrition levels within the community while increasing demand for locally-grown soybeans.

“We chose to make soybean products because they are good for you, and the community also grows a lot of soybeans. So if we are preparing soybean, it fits into our culture”, explains Teresa, adding that the women of Nossara all grow soybeans themselves.

When Nossara members first began cooking together several years ago, they passed out free samples and talked to community members about the health benefits of soybeans. They focused their efforts on pregnant women and children, although others soon began asking for soymilk as well. “It’s a very energy-rich milk”, says Teresa, the cooperative’s president. “It’s good for the whole family.”

Nossara has plans to become a bigger business. “We want to advance, become a company”, Teresa says. Through the support of TechnoServe, the cooperative has recruited new members in nearby towns, women who can introduce their neighbors to soy products and help develop the market throughout the region.

“The soybean product market can be profitable”, Teresa insists, referring to the satisfied customers she meets every day in Ruace. “Sales are increasing a little more each month, every year. We are growing.”





Market linkages

In order for the small commercial farmers to succeed as seed multipliers and service providers in their community, TechnoServe recognized that they would need to be organized in order to better market their goods and services. In May 2014, the Cooperativa de Produtores de Alta Zambézia (COPAZA) was formed, initially with the first 6 small commercial farmers and later to include all 31 farmers.

The primary purpose of the cooperative is to organize these **small commercial farmers as local seed multipliers and grain producers to be able to play a key marketing and advocacy role, and as well as to build a network and community for them to share experiences and best practices.** The cooperative has a president and members, who meet monthly to discuss various topics, most especially to discuss price negotiations at the time of harvest and commercialization. All the agronomic and business trainings given by TechnoServe and consultants throughout the years were delivered to these small commercial farmers as members of COPAZA.

In 2017, COPAZA co-invested with a Mozambican private investor for the creation of a joint venture and seed company named Sociedade de Beneficiamento de Sementes (SBS), which operates a seed processing plant in Gurue, Alta Zambézia. SBS forward-purchases harvested seed and grains from COPAZA members and others, then cleans, grades, treats, cools and packages it in its processing facilities. This seed is then made available to the small commercial farmer network and others to sell directly to smallholder farmers.

To date, SBS has purchased 279 tons of certified seed from COPAZA members. In 2018 alone, SBS purchased 126 tons of seed, which after processing led to 102 tons of certified seed for SBS to sell. Large companies who are the offtakers of SBS seed have compared SBS seed to that from other companies and have found it of higher quality, e.g. 15-40% higher yield reported.



Lessons learned

1 A cooperative is a good way for farmers to organize, but they need to invest in the organization.

Though the small commercial farmer who first joined as COPAZA members may have agreed with the group's mission, the initiative was led by TechnoServe. Organizing farmers into cooperatives is challenging; they live far apart and are very busy so finding time and a good location for them to meet often can be difficult. A sustainable cooperative needs to have rules and regulations to ensure membership is reliable, as well as a source of income and at least one staff to organize meetings and collect data on the member's production. The farmers in the cooperative need to really believe in the utility of the cooperative and be willing to invest in it. They also need to be active about seeking out the market and ensuring there are buyers for the seed production and cannot rely on organizations such as TechnoServe to do this for them.

2 Market linkages for small commercial farmers need to be well-established and sustainable.

In the first year, TechnoServe bought all the seed produced by COPAZA members, which was important to stimulate production but was not sustainable. SBS was then formed with the idea that it could provide a reliable market for COPAZA. Seed production by COPAZA has doubled in the last two years and quality has improved, however, in 2017-2018 only ~40% of the seed was absorbed by SBS. Small commercial farmers need more support developing off-take agreements with SBS and other seed companies to ensure ready market and high prices for seed produced. Discussions with other seed companies are already underway, and future production planning will be based on contracted volumes.

3 A seed company and processing plant in a rural area can be profitable, but needs a lot of support.

SBS faced difficulties in two main areas: marketing support to boost its own sales and financing for operational costs. To boost SBS sales, TechnoServe worked to co-develop with SBS and COPAZA a marketing plan with several activities to promote the selling of seed produced by COPAZA, both locally (e.g., flyers, billboards and radio commercials) and nationally (e.g., conferences, website, social media). Additionally, SBS struggled to find the working capital needed to pay COPAZA upon delivery of seed; they were only able to pay 40% up front around June 2018 with the rest promised upon sale that would take place from December to February 2019. For SBS to be profitable, they need support to increase seed sales and lower operational costs.



Stories from the field

Seed company SBS provides cleaner, faster and more cost effective seed processing

In order to sell certified soybean seed, small commercial farmers in Alta Zambézia needed to take their harvested seed to a processing facility where it could be cleaned, treated, graded, cooled, and packaged. However, most of the commercial seed processors used for these post-harvest steps were located in Nampula, a neighboring province. The transportation to Nampula and back added to the costs of the small commercial farmers, thus detracting from their profits.

Moreover, though these small commercial farmers had successfully begun producing the seed, they had not found a sustainable and reliable market for the seed. In addition to selling to smallholder farmers, who often need to buy on credit and are inconsistent buyers, it was important that the small commercial farmers had larger seed off-takers who could ensure a certain level of sales each year.

In 2014, COPAZA, the cooperative of small commercial farmers, partnered with a Mozambican company called Sociedade de Desenvolvimento Agropecuario (SDAP), part of the Txopela Investments SA Group, to invest in the creation of seed company Sociedade de Beneficiamento de Sementes (SBS), which would help to solve these two problems.

“SBS is important because it provides the small commercial farmers with a sustainable market for their seed.”



Through an investment of nearly USD \$850,000, SBS constructed a seed processing plant in Magige, a town located about 40 km outside of the commercial hub of Gurúè, with the capacity to process seed at a rate of about 15 metric tons per day. The new SBS facility allows the small commercial farmers to process their seed locally, thus reducing transportation costs while enhancing flexibility and quality in processing multiple seed types for sale by COPAZA's network. The strong linkages between SBS and COPAZA, combined with the technical assistance from TechnoServe, allowed the production of high quality, certified seed.

SBS buys and then processes soybean from COPAZA. Unlike other seed buyers, SBS can do so at a larger capacity for commercial sale. With SDAP holding 80% of the company,



and COPAZA members owning the remaining 20%, SBS' strategy is to buy seed (currently just soybean but will include other seeds in the future) from COPAZA's small commercial farmers, to whom they also offer training on growing certified seed. Since its opening, SBS has purchased 279 tons of seed from COPAZA and processed 146 tons of that seed.

Joao Forte, the director of SDAP, believes that seed multiplication is only the beginning for SBS, and with COPAZA as a 20% owner, the Small Commercial Farmer network has the potential to win big and make an impact on the Alta Zambézia region. Mario Rui Vieira, the general manager of SBS and member of COPAZA, believes that SBS is important because it provides the small commercial farmers with a sustainable market for their seed.

As a testament to the quality of the seeds processed by SBS, large agro-dealers including Hoyo-Hoyo have purchased over 46 tons of soybeans from SBS and plan to purchase 60 more this season. The director of Hoyo-Hoyo, Rito Muaquiua commented that this



seed is the best quality of soybean that he has purchased in Mozambique. He will continue to place orders and credits the seed multiplication model supported by TechnoServe and the technology of SBS for the quality and success.

Small commercial farmers who sold their seed to SBS for treatment and processing, bought back over 46 tons of seed—either for their own production or to sell as certified seed back in their communities to smallholder farmers.

Through a distributor, SBS sold another 8 tons of seed to smallholder farmers.

Even in the face of many challenges, SBS and their partner COPAZA were able to infiltrate the seed production market and provide improved, certified seeds to thousands of local farmers. SBS and COPAZA will continue to build on this success to make them the leader in seed processing and production on a commercial scale in Mozambique.



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Kingdom of the Netherlands



Seed Multiplication Project to Empower Small Commercial Farmers

The initial Small Commercial Farmer network operated as seed multiplication project from 2012 to 2015, and was designed to increase the availability of affordable, high-quality seeds in Mozambique. Funded by the Embassy of the Kingdom of the Netherlands, the network strategically focused on linking the small farmer network for soybean seed to the rapidly growing demand for poultry feed. By the end of its fourth season, the project had supported 31 small commercial farmers to grow and distribute improved seeds. In the project's second phase, which concludes at the end of 2018, the network of individual small commercial farmers has been commercially strengthened through the formation of COPAZA that buys and sells operations with private sector parties, and has attained a 20 percent shareholding in a new seed processing plant owned by seed company SBS. The project has contributed to the creation of rural growth "hubs," which are led by targeted investment in small commercial farmers as economic engines to spur local rural development.

Research on Post-Harvest Losses in the Soybean Value Chain

Through its work with small commercial farmers, smallholder farmers and COPAZA, TechnoServe recognized that low yields were further hampered by post-harvest losses, which farmers experienced during threshing due to inadequate storage options. Furthermore, constrained access to finance limited access to labor-saving technologies and storage options. Taken together, these constraints created major barriers for the productivity of smallholder farmers. With funding from AGRA, TechnoServe built upon its experience in equipping small commercial farmers to access and invest in key technologies related to threshing, storage, and processing. Through this project, TechnoServe tested, monitored, and scaled the use of post-harvest management services and technologies in a way that significantly reduces post-harvest losses in the soybean value chain. TechnoServe also supported the promotion of increased production and marketing of nutritious soy-based food products through targeted technical assistance and market linkages, specifically to female-owned micro-processing and micro-retailer groups.

For more information, please visit www.ipweu.com.

ABOUT TECHNOSERVE



TECHNOSERVE

BUSINESS SOLUTIONS TO POVERTY

TechnoServe works globally with enterprising people in the developing world to build competitive farms, businesses, and industries. It is a nonprofit organization that develops business solutions to poverty by linking people to information, capital, and markets. Its work is rooted in the idea that hardworking people can generate income, jobs, and wealth for their families and communities. With more than four decades of proven results, TechnoServe believes in the power of private enterprise to transform lives. TechnoServe first began operations in Mozambique 20 years ago in 1998. Historically, TechnoServe in Mozambique is known for its work in developing the cashew, poultry and soybean value chains, though it is also known for its important work in eco-tourism, agro-forestry and seed systems. Throughout the years, TechnoServe has

built strong relationships with public and private sector actors in Mozambique and has been working along side these partners to develop inclusive business models for sustainable, wide-scale growth and poverty reduction. Through these inclusive business models, TechnoServe aims to create and support competitive and sustainable commercial industries that generate opportunities for small-scale rural producers and suppliers, in addition to new employment opportunities for the rural poor. TechnoServe works with its corporate partners to leverage and promote investments in key industries and build local supply chains for sourcing, as well as public sector partners to build capacity to regulate and promote these growing industries.





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