

2015

Mechanization survey, 2015

A Report on the Research Findings

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Executive Summary

Agricultural productivity in Zambia has remained well below global averages¹. Rural households account for much of the agricultural production and one of the major reasons for their low production and productivity is the limited access to productivity enhancing technologies, such as agricultural machinery. In view of this, Musika supported tractor financing schemes that would help to see existing tractor sales also channeled into the smallholder market. The recipients of the tractors would provide agricultural services commercially to the wider smallholder community thereby promoting productive farming systems for smallholders. Following the implementation of this intervention, a survey was conducted in March 2015, to assess the viability of agricultural service contracting in rural markets and the impact of accessing the services on smallholder agriculture. The survey interviewed players at two nodes of the service provision chain; the tractor service providers, and the farmers or clients purchasing the services. Data on two agricultural seasons: 2012/2013 and 2013/2014 was collected upon which a before-and-after analysis was done to generate indicative estimates on the effect of mechanization. The contractor level data was used to construct case studies that profiled the business performance of agricultural service providers.

The findings showed that about 47% of the farmers had accessed tillage services in the baseline year. In addition, 38% of the households utilized haulage services in the 2013/2014 season, representing a 7.6% increase in the accessibility of haulage services. The amount spent on land preparation was halved between the two seasons, thereby reducing the amount of time spent on cultivation from 2 weeks to about 1 week.

45% of the households increased the total area under production by about 2.5ha, 20% maintained the same area under production while 35% experienced a reduction in area cultivated. The number of crops cultivated between the two seasons was examined and it was found that 30% of the households decreased the total number of crops grown by 1 crop type, while only 14 % increased the number of crop enterprises by about 1 to 2 crop types. The majority of the households (56%), maintained their crop portfolio between the two seasons, indicating that there was no significant effect on the number of crop enterprises farmers engaged in between the two seasons.

Farmers accessing mechanized tillage services cultivated about 5 ha of land and were applying mechanized tillage methods on about 3 ha. Maize accounts for the highest crop under mechanization followed by cotton (90% and 12% of households respectively). Farmers that used mechanized tillage methods for maize and cotton production allocated an average of 3.8 ha for maize and 2.6 ha for cotton. Maize production increased by an average of 17%, representing an absolute increase of 2555.7kg. The maize yield increased by an average of 8% (or 370kg).

¹ "Agricultural Productivity in Zambia", ACF, 2010.

Cotton production on the other hand increased by only 4% (115.4kg), while cotton yields decreased by 16% (-216.7kg). Annual cotton production was heavily affected by falling prices and many cotton growers significantly reduced their investment in its production and improved practices. These external factors marred the potential benefits that mechanization would have resulted in.

In the contractor case studies compiled, it was demonstrated that the application of sound business principles in agricultural service provision could yield very high incomes for the contractor. It was perceived that contractors that operate in formal or informal institutional networks or farmer groupings have better opportunities for success than those who operate independently. Even though it is true that working through institutional networks can be advantageous, this study found that not all the contractors operating within such networks experienced success. There are other significant determinants of business viability such as: effective marketing, prudent monitoring of the business, performance of tractor operators (in cases where the owner of the tractor hires drivers) and the ability to identify cost minimization opportunities. Other characteristics inherent to the contractor such as, personal motivation, strong business or commercial philosophy and commitment to the business also played a key role in creating successful business operations.

1. Introduction

Like many other African countries, Zambia's agricultural production and productivity remains below the global averages. Measures of productivity such as yield are at about half that of the world averages for the major cereals and legumes². Despite this, agriculture remains a primary source of livelihood for Zambians, supporting about 66% of the population³. Rural households account for much of the agricultural production and one of the major reasons for their low production and productivity is the limited access to productivity enhancing technologies such as agricultural machinery⁴.

In an attempt to transform the production landscape for smallholder agriculture, development agencies and government in the past sponsored mechanization schemes in order to increase the ownership and use of tractors among smallholders, however this achieved little results⁵. Because of this, mechanization in small-scale agricultural production has been perceived as a misapplication of technology to a sector accustomed to utilizing simple and conventional methods of production. However, one of the key lessons derived from past experiences is that incorporating sound business principles or commercial approaches to machinery ownership and mechanized service provision had the potential to provide sustainable opportunities for smallholder access to mechanized services.

It is on a similar backdrop that Musika supported commercially focused tractor financing schemes that would help to see existing tractor sales channeled into the smallholder market. The private sector's participation in this area has been largely focused on commercial agriculture - tractor suppliers mainly service the commercial farmers while asset financiers consider the smallholders to be too risky. However, Musika partnered with equipment suppliers and financiers, and provided technical and financial support that enhanced their ability to invest in rural markets, thereby improving the smallholder's access to agricultural machinery. As a result of this support, farmers can purchase tractor equipment from these suppliers on cash or loan basis. Given the limited financial capacity, the majority of the farmers purchased the tractors on loan basis.

Currently, there is a gap in knowledge about the viability of contracting agricultural services to rural farming households, and anecdotal information exists on the impact of accessing these services on small holder livelihoods. Therefore Musika conducted a survey to assess the viability of contracting mechanized services in rural markets, as well as the effect of accessing mechanized services on smallholder production and productivity.

² "Agricultural Productivity in Zambia", ACF/FSRP, 2010.

³ Technical Compendium, IAPRI, 2012.

⁴ "A Survey of Mechanization Problems of the Small Scale (Peasant) Farmers in the Middle Belt of Nigeria", Yohanna et al. 2011

⁵ CFU, 2012.

2. General Objective

To assess the business viability of contracting agricultural services in the rural sector and the impact of accessing these services on smallholder production.

3. Methodology and Data Analysis

The survey utilized both quantitative and qualitative surveys carried out in 4 regions: Central, Eastern, Lusaka and Southern, in which 8 districts were covered. Players at two nodes of the service provision chain were interviewed; the tractor service providers, and the farmers or clients purchasing the services. 92 smallholder farmers were sampled using the snowball sampling technique. As for the service providers, 7 tractor owners were selected based on the period they have been engaged in service provision (equal to two years or more). Structured interviews were administered to both types of participants via an electronic instrument (i-form).

The farmer survey collected data on two seasons - 2012/2013 and 2013/2014 agricultural seasons, upon which a before-and-after analysis was done. The final analysis was based on a total of 89 farmers: three farmers were dropped during data cleaning. Microsoft Excel tools were used for data analysis and charting and statistical tests conducted for some of the computed farmer level estimates such as production and productivity.

The contractor study collected data for the contractors that have been offering mechanized services for at least two years. A total of 7 contractors were interviewed and 3 of those interviews were used to create case studies of their businesses. The contractors profiled were from Mumbwa, Kabwe and Chibombo. Each case study has an outline or discussion on Key performance indicators (KPI's) such as Total Revenue, Costs of Operations and Total Profits (Operating Profit and Net Profit) - which were used to assess business performance. Other attributes of the business such as the loan status and record keeping practices were also examined. A brief financial statement accompanies each case, and Sensitivity analyses were performed to assess the sensitivity of the profitability indicators to changes in the volume of services offered. The three case studies have been organized into 3 distinct scenarios that showcase; "The most viable" contractor, the contractor with "Average viability" and "Low viability". In each case, a discussion is included on the factors influencing their performance.

4. Research findings

Section 1: Effects of Mechanization at Household Level

4.1 Social Characteristics

About 90% of the farmers sampled were male, and the average age of male and female participants was found to be 48 and 54 years respectively. Past research suggests that age may have an implication on technology adoption; younger farmers are considered less risk averse and more willing to test new technologies than older farmers. However in this study we found that all the farmers accessing mechanized services (or testing the technology) were over 45 years old. Education attainment is a common proxy for the farmer's ability to process and use information; and this can have a significant effect on how farmers view productivity enhancing technologies. This study found farmers accessing mechanized services had at the least crossed over into Junior Secondary Education.

About 38% of farmers that accessed mechanized tillage also utilized haulage services. This represented a 7.6% increase in the accessibility of haulage services by farmers from the 2012/13 to 2013/14 agricultural season, as shown in Table 1.

Table 1: Household Social Characteristics and Access to Other services

	Age by Gender in year		Average years in Education		% of farmers accessing Haulage services in 2014	Change in % of farmers accessing Haulage services from 2013 to 2014	% of farmers accessing boom spraying services 2014	Change in farmers accessing booms praying services between 2014 and 2013
	Female	Male	Female	Male				
Total	54	48	9	9.5	38%	7%	4%	1%

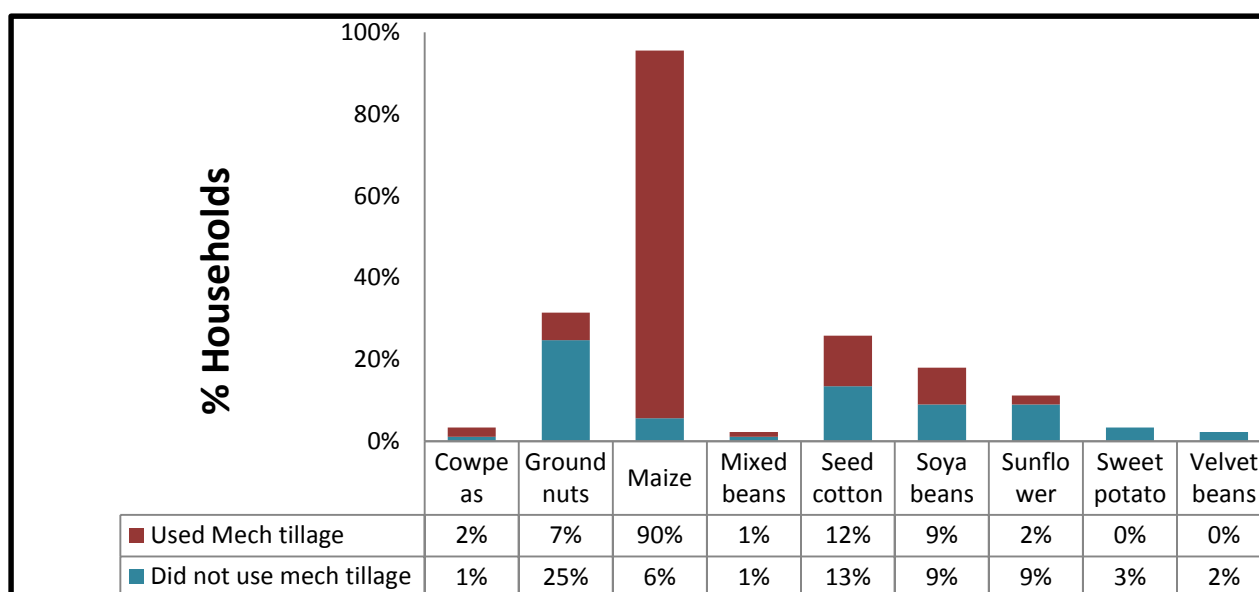
4% of the farmers accessing mechanized tillage services also accessed boom spraying services in the 2013/2014 season. There was a measly increase of 1% in the accessibility of mechanized boom spraying services between 2012/13 and 2013/14, suggesting that a lot of farmers were not soliciting for boom spraying services.

4.2 Allocation of Mechanized Services to Crops

About 47% had accessed tillage services in the baseline year. This means that a little over half (53%) of the farmers were additional clients, accessing the services for the first time in the 2013/2014 season. The study collected production data on nine major crops: Burley tobacco,

Cassava, Cowpeas, Groundnuts, Maize, Mixed beans, Seed cotton, Soya beans, Sunflower, Sweet potato and Velvet beans. The majority of the farmers accessing mechanized services were maize growers (96%), followed by groundnut growers (32%), cotton growers (25%), soya bean growers (18%), sunflower growers (11%), while cowpeas, mixed beans, sweet potatoes and velvet beans growers were less than 10% respectively. Similarly, the allocation of mechanized tillage to crop types was highly skewed towards maize production, with 90% of the households utilizing the service for cultivating maize fields. Despite having a considerable proportion of groundnut growers compared to cotton growers, more households purchased tillage services for cotton production (12%) rather than groundnut production (7%). Less than 10% of the households used mechanized services for soya beans, sunflower, cowpeas and mixed beans production, respectively. Estimates are illustrated in Figure 1.

Figure 1: Household allocation of mechanized tillage services: by Crops grown

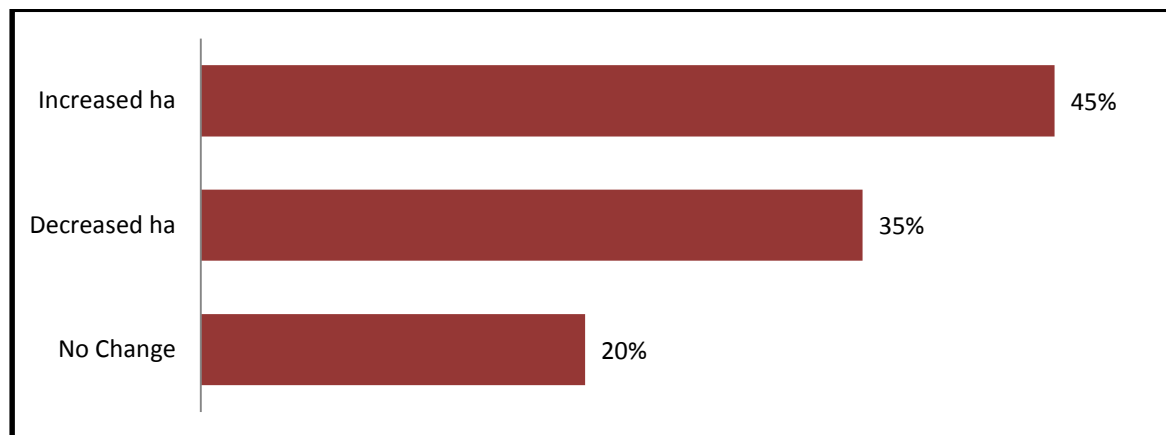


4.3 Effect of Mechanization on Area cultivated and Timeliness

Tractor powered tillage facilitates for good farm management practices such as timely planting, and can potentially reduce labor costs and manual effort for land preparation. It was observed that access to tractor services significantly reduced the amount of time spent on cultivation. Between the 2012/2013 and 2013/2014 seasons, the total time spent per household on land preparation was halved from an average of about 2 weeks to about 1 week. Furthermore, a considerable proportion of households had increased the total area under production in the 2013/2014 season. 45% of the households had increased total area under production by about 2.5ha, 20% maintained the same area under production while 35% reduced the area cultivated by

about 1.5ha (Fig. 2). Many of the farmers that showed a reduction in area cultivated cited financial constraints (that limited input access), as the major reason.

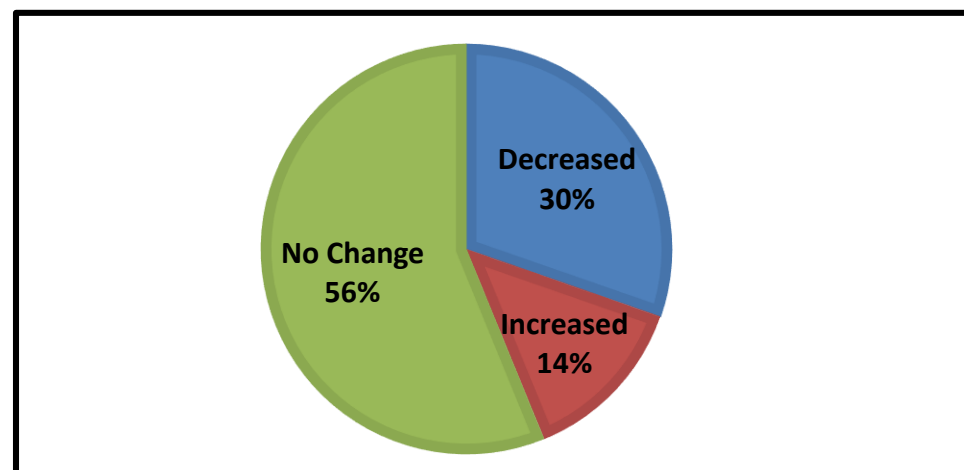
Figure 2: Change in Average Hectares Cultivated by Households



4.4 Effect of Mechanization on Number of Crop Cultivated

It was noted that about 30% of the households decreased the number of crops they cultivated by about 1 crop type, while only 14 % actually increased the number of crops grown by about 1 to 2 crop types. The majority of the households, about 56%, maintained their crop portfolio between the two seasons. There were no significant effects on the number of crop types farmers engaged in between the two years.

Figure 3: Change in Number of Crops Cultivated (Crop diversification)



4.5 Effect of Mechanization on Production and Yield

Farmers accessing mechanized tillage services were cultivating about 5 ha of land, and were using mechanized tillage services on 3 ha of land. Maize accounts for the highest crop under mechanization followed by cotton (90% and 12% of households respectively), therefore, maize and cotton will be used to illustrate the effect of mechanization on production and productivity. The average maize area per household under mechanized tillage methods was about 3.8 ha and 2.6 ha for cotton. Maize production increased by an average of 17%, representing a quantity of about 2555.7kg, while the yield increased by an average of 8% (370kg). Cotton production on the other hand increased by only 4% (115.4kg), while cotton yields decreased by 16% (-216.7kg), table 2.

Table 2: Change in Production and Yield for Maize and Cotton Producers

Crop type	Production (kg)			Yield (kg)		
	2012/2013	2013/2014	Change	2012/2013	2013/2014	Change
Maize	14985.3	17248.5	2555.7	4405.3	4681	370
Cotton	2449.6	2565	115.4	1325.8	1109	-216.7

*0.05 significance level⁶

Other studies such as the RALS and CFS 2012 results⁷ showed similar trends in cotton yield estimates. Cotton production was heavily affected by falling cotton prices from 2011. Some of the buyers offered prices as low as K1.6/kg from the K3.5/kg offered in previous years⁸. By the 2013/2014 season, many cotton growers significantly reduced cotton input purchases and production. In addition, investment in improved production practices by households was also reduced thereby affecting yield values. These external factors marred the potential benefits that mechanization would have resulted in for cotton producers.

Results suggest that mechanization had a positive effect on maize production and productivity. In addition, farmers improved timeliness in land preparation activities. Results for cotton were uncertain due to the external pricing factors that affected production, countering the potential benefits that mechanization would have resulted in.

⁶ Statistical tests conducted at 95% confidence level. This means that we can be 95% sure the effect or difference in the values between the years are not by chance, or due sample variance.

⁷ "Technical Compendium", IAPRI, 2012.

⁸ "Focus on Development", Nawa, 2014. (<http://nawa-doreen.blogspot.com/2014/08/poor-prices-threaten-zambias-cotton.html>)

Section 2: Viability of Agricultural Service Provision

Entrenched in Musika's methodology is the concept of creating sustainability by supporting mutually beneficial business relationships. Whereas results have demonstrated the benefits of mechanized services to smallholders, there is inconclusive information about the contractor's viability in rural smallholder markets. This section therefore discusses the business performance of the contractors and the factors affecting their viability, with specific focus on those contractors that accessed tractors via asset financing facilities.

Summary of Case Study Findings

Past observations suggest that contractors that operate within formal or informal networks tend to have more viable service operations. This basically suggests that contractors providing services to farmers linked to organizations such as CFU, farmer cooperatives, or out-grower schemes have better chances of success. The reasons proposed for this are that, firstly, contractors have institutional backing that tends to inspire farmer confidence, and secondly (and most importantly) such networks provide an opportunity for contractors to access, market and provide their services to larger farmer groups. Even though it is true that institutional networks can be advantageous, this study found that not all the contractors operating within such networks experienced success, but that the application of sound business practices was a paramount prerequisite for success. Significant determinants of business viability included: tractor operator performance (in cases where the owner of the tractor hires drivers), effective marketing, prudent monitoring of the business, and the ability to implement cost minimization techniques. Other characteristics inherent to the contractor such as, personal motivation, strong business or commercial philosophy and commitment to the business also played a key role in creating successful business operations.

Tractor owners that hired tractor operators were at high risk of facing principal-agent problems. The operator was responsible for critical aspects of the business such as demand creation, actual service provision, and identification of cost minimization opportunities. Contractors employing performance based compensation policies and high monitoring efforts reduced this risk. It was observed that the commission based salaries inspired high performance – drivers paid on commission basis generated much higher sales and outperformed the drivers on a fixed salary. Seeing that many tractor owners hire tractor operators, financial literacy and business training should have a “train the trainer focus” to ensure knowledge is transferred. In addition, the training should also focus on teaching farmers (contractors) how to use information (business records) for decision making. The contractors maintained somewhat good record keeping practices, but they did not use the records for assessing the financial health of the business or decision making.

Contractors were prone to underutilizing the tractor's capacity. Tractor experts advise that machine downtime is costly in a business. The tractor depreciates with time and use; therefore tractor owners are advised to accumulate as much work hours on the tractor as possible during its economic life. One means that has been demonstrated of improving tractor utilization is to create continuous 24 hour work shifts. Tractor utilization and revenue was significantly increased by creating 3 eight hour shifts and employing a driver for each shift.

Group servicing reduced transaction costs. Contractors that insisted on offering services to groups of farmers rather than individuals significantly reduced search costs. Some contractors travelled to a particular community to provide services only when clients in that community organized themselves into groups of a minimum size.

It was noted that the majority of the contractors did not understand some of the terms of the loan facility such as the level of interest, or the asset value vs. the loan value. In addition, the many of them did not closely review business records or monitor business operations, in cases where a tractor operator was hired.

Case Study 1: Low Viability

Background

Mr. Banda⁹ is a 60 year old male contractor from Chibombo district. He attained tertiary education, and is a holder of a Certificate/Diploma. He acquired a 60 hp tractor in November 2013, for a total loan value of K154000. At an interest rate of 20%, his annual loan repayment was at K58, 926. Mr. Banda employed his 30 year old son as tractor operator. The son is the manager of the business or primary person in charge, responsible for marketing, actual provision of services to the smallholder community, record keeping and other operational duties. Earnings from the business belong to Mr. Banda and are remitted to him at set intervals.

Asset : 60 hp Tafe Tractor	
Loan	K154000
Interest rate	20%
Annual payment	K58925.69
Price of tillage services/Ha	K300
Total Ha cultivated	60ha
Total revenue	K18,000.00
Total operational costs	K19,815.38
operating profits	-K1,815.38
net profit/losses	-K60,741.07
operating profit as a percentage	-10%
net profit as a percentage	-337.45%

Revenue generation

Mr. Banda offered ripping services and in his first year of business, he ripped about 11 ha for a total number of 6 farmers. Because he acquired his tractor late into the season, he missed part of peak demand period for ripping, thereby recording low sales in 2013. In the following year however, the business increased its outreach and ripped about 60 ha for a total number of 23 farmers. He charged K300/ha for ripping, generating K18,000 worth of annual revenue. Despite this growth in sales, Mr. Banda's business was operating

below the general capacity for smallholder use or service provision¹⁰. When compared to other contractors, we found that the average contractor ripped about 2.5 times more hectares than Mr. Banda, in a year.

Costs

In the second year of operation, Mr. Banda's costs of operation increased significantly in comparison to the volume of sales generated. This was arising from the high unit search costs incurred, which were at an average of K174 per client located. This is significantly higher than

⁹ Name has been changed to uphold confidentiality requirements.

¹⁰ According to SARO generally smallholder farmers/contractors accumulate about 600 hours and greater on the tractor annually, under normal operating conditions. This translates to a range of approximately 600ha and greater: Jabes Mbewe, Saro Agro-Industrial Ltd.

the unit search costs incurred by other contractors. In addition to this, Mr. Banda indicated that it took about 4 hours for his tractor to rip a hectare – a highly inefficient rate of operation which dramatically raises fuel costs. Generally, contractors took about 45 minutes to 1 hour to rip through 1 hectare. To explain this, he pointed out that many of the fields in the area he serviced were not well prepared for machine powered tillage equipment; hence the driver encountered too many stumps that reduced the efficiency of the tractor. Mr. Banda did not set a salary for the tractor operator; therefore the costs associated with the driver could not be accounted for. Inclusive of fuel, maintenance and repair costs, the total annual operating costs for Mr. Banda's service provision business amounted to K19, 815.4, exceeding the revenue generated by about K1,800.

Profit

Mr. Banda's annual operating profit/loss for the year 2014, which is profit minus variable costs, stood at - K1815.4, representing a profit margin of about -10%. The net profit/loss for the same year, which is operating profit minus loan repayments, stood at -K60, 741, representing a net profit margin of -337.4%. This shows that business' earnings for the year 2014 could not cover both the operational costs and debt repayment obligations.

“Revenue from service provision cannot sustain all the operational costs and loan repayments; it just helps me raise enough money to cover the fuel costs. I normally have to supplement the loan repayments with income from my other businesses, Mr. Banda said.

Record Keeping and Audit Practices

The manager of Mr. Banda's business maintained good record keeping practices. Information was collected on the area tilled, number of clients serviced and many other aspects. However, Mr. Banda did not regularly review or use those records to assess the financial health of the business and for decision making. Even though he is the owner of the business, he expressed little knowledge about part of the business operations, such as the amount of costs incurred¹¹. It was also observed that Mr. Banda did not fully understand the terms and conditions of the lease agreement. He expressed ignorance about the level of the interest rate for his loan, or difference between the principle and total loan amount¹². It is cardinal that farmers understand the terms of the lease agreement because firstly, the loans accessed were variable interest loans, therefore interest payments and loan repayments were subject to change. Some of the contractors that did not understand why the loan repayments varied developed a negative perception of the financier. Secondly, the terms and conditions of the loan directly impact the profitability of the contractor.

¹¹ The manager was the custodian of the business records, and the primary source of data for this study.

¹² Information on the terms and conditions of the lease was validated by gathering data from other participating organizations such as Musika and SARO.

Loan Status

According to Mr. Banda, only about 25% of the loan was paid as of October 2015. He was lagging behind on loan repayments, and regularly used other sources of income to supplement the loan repayment. Apart from agricultural service contracting, Mr. Banda owned other non-agricultural related business ventures as well as a viable farming business. Compared to the other businesses he owned, service provision was not a high priority venture for him. When asked about his perception on the profitability of agricultural service contracting in rural markets, his response did not express confidence in the idea that service provision was profitable.

Business Outlook and Implications

If Mr. Banda continues to operate at the current level of efficiency, he would need to cultivate an extra 14 ha to meet his operational costs. To break even (or make net profits of zero), he would have to cultivate an additional 456 ha, which translates to approximately 176 extra farmers. This exceeds the level of sales that the most successful contractor who was making positive net profits.

In order for Mr. Banda to break even, he needed to make 11% more sales than the most successful contractor making 15% net profit margins.

Mr. Banda attributed the low performance of the business to high competition, low farmer demand for agricultural services and bad weather. Despite facing similar conditions, some contractors interviewed did perform better.

We found that other reasons for the low performance were high search costs, low tractor operator performance, poor audit practices and low asset/tractor utilization. The tractor operator conducted the marketing or advertising activities, identified target areas and performed the ripping activity itself. Mr. Banda did not closely monitor the business or review its records. In addition, he could not participate in the day-to-day operations. Because of this, he was at high risk of facing principal agent problems. Financial and business management training and commission based salary plans for the tractor operator could help to mitigate that risk. Hiring family labor, like was done in this case, was unfortunately not a sufficient risk mitigation strategy. Also, monitoring efforts by the tractor owner can also help improve business performance.

The contractor should make clients aware about how to prepare fields intended for tractor tillage. Ensuring that farmers learn this will reduce the inefficiency at which the tractor was operating. Group servicing can reduce operational costs; however it did not emerge as a cost saving strategy that was being implemented in Mr. Banda's case. Potential clients from the same community should be encouraged to organize themselves into groups, so that travel requirements to individual clients are minimized. For instance, a Chipata contractor encouraged farmers seeking his services to organize themselves into groups, ensuring to travel to their community only after they have reached a specified minimum number.

All in all, the contractor did not fully apply sound business principles necessary for success.

Case Study 2: Average Viability

Background

Mr. Chileshe¹³ is a 41 year old male contractor from Mumbwa district who has attained Junior Secondary Education (Grade 9). He acquired a 60 hp tractor in October 2013 for a total loan value of K142, 000. At an interest rate of 20%, his annual loan repayment was K62893.47¹⁴. Mr. Chileshe did not directly operate the tractor but hired a driver who was in charge of providing the services. The driver was on a fixed salary and remitted the earnings from the business regularly to Mr. Chileshe.

Revenue Generation

Mr. Chileshe offered both ripping and haulage services within Mumbwa's farming community. In the 2013/2014 season, he ripped about 52 ha for a total number of 26 smallholder farmers. In

Asset : 60 hp Tafe Tractor	
Loan	K142000
Interest rate	20%
Payment/year	K62,893.47
Price of tillage services/Ha	K270
Total Ha cultivated	151 ha
revenue from ripping	K40770
revenue from haulage	K32000
Total revenue	K72,770.00
Total operational costs	K40,986.00
operating profits	K31,784.00
net profit/losses	-K31,109.47
operating profit	44%
net profit/loss	-42.75%

addition, he earned about K1500 from haulage services. In the first year of operation, sales were low as the business was still in its infancy. In the following year, however, Mr. Chileshe's business operations grew significantly, and about 151 ha was ripped, for approximately 50 farmers. He charged K270/ha for ripping services. Earnings from revenue also increased to about K32000, accumulating total annual revenue of K72,770. Revenue from haulage significantly contributed to total earnings, providing about 44% of the total revenue. Mr. Chileshe's sales from ripping were higher than Mr. Banda's (case 1), however still below Ms Phiri's (case 3) who ripped about 3 times more.

Costs

Of the three contractors, Mr. Chileshe had the lowest search costs of about K90 per client. In addition, the tractor operations were conducted within the recommended levels of efficiency – the tractor operator spent between 45 minutes to 1 hour 30 minutes on ripping a hectare of land. Fuel costs from haulage services increased the

¹³ Name has been changed to maintain the confidentiality and anonymity requirements.

¹⁴ Loan repayment period differs depending on financier and time of acquisition. Values therefore differ from one contractor to another, even when the tractor model is exactly the same.

variable costs, however, the revenue earned from haulage services sufficiently covered this cost. The total operational costs in the business were about K40, 986.

Profits

Mr. Chileshe was able to generate about K31, 784 in operating profits, representing a profit margin of about 44%. However he recorded negative net profits of about -K31, 109.5, representing net losses of about 43%. This means that the income from both haulage and ripping in the 2014/2015 season could only cover about half of the annual loan repayment.

Record Keeping and Audit Practices

The tractor operator maintained good business records. Despite this, Mr. Chilshe did not have good knowledge of the information contained in the records. For instance he was unsure about the total maintenance and repair as well as fuel costs. Like Mr. Banda (profiled in the first case study), he did not know aspects such the interest rate on the loan¹⁵. Such information is critical for a contractor to be aware of as it directly impacts the profitability of the business.

Loan Status

Mr. Chileshe is on track with the debt service schedule. However, he used other sources of income in addition to income from tractor operations, to supplement loan repayments.

Despite not fully covering the 2014 loan repayment by about half the amount in 2014, Mr. Chileshe generated revenues that far exceeded the operational costs (by 44%)..

Business Outlook and Implications

To break even, Mr. Chileshe had to rip an additional 169 hectares for 57 more clients. The contractor operated at a much higher level of efficiency and earned extra income from haulage services, therefore he needed to rip fewer hectares to make positive net profits. The most important component that needed improvement in this business was the level of farmer outreach. More marketing was required to increase sales. In addition, the tractor operator's performance was identified as a risk even for this case.

In conclusion, we found that Mr. Chileshe's business was operating cost-effectively, and only needed to improve the volume of sales generated. Two primary avenues could be used to do this: improve marketing efforts as well as employing a commission based compensation for the tractor operator in order to inspire higher performance.

“Service provision has been a very challenging business. Even though I make enough money to meet my operational costs, I still find it difficult to raise enough money to meet the loan repayment, Mr. Chilsehe said.

¹⁵ Driver was the custodian of business records

Case Study 3: High Viability

Background

Ms. Phiri¹⁶ is a 43 year old female contractor from Kabwe district who has attained tertiary education, and is a holder of a bachelor's degree. She acquired a 65 hp John Deere tractor in August 2013 from Afgri for a total loan value of K127, 000. At an interest rate of 17%, her annual loan repayment was K57476.8. In 2014, she hired 3 tractor operators on commission basis, who were responsible for providing the tillage services.

Asset : 65 hp John Deere Tractor	
Loan	127000
Interest rate	17%
payment	57476.86
Price of tillage services/Ha	300.00
Total Ha cultivated	457
Total revenue	137,100.00
Total operational costs	58,605.27
operating profits	78,494.73
net profit/losses	21,017.87
operating profit as a percentage	57%
net profit as a percentage	15.33%
% of loan remaining if all profits were remitted	54%

Revenue generation

Ms. Phiri offered tillage services to areas in the rural parts of Kabwe district. In the first year of operation, her business ripped 60 ha for 78 smallholder farmers, a good start compared to other contractors. In her second year of business,

Ms. Phiri experienced record growth in 2014, cultivating about 457 ha for a total number of 208 small holder farmers.

She charged K300/ha for ripping, and generated K137,00 in annual revenue. Of all the contractors ever interviewed, Ms. Phiri was found to have the highest sales.

Costs

Because of paying out commissions, Ms. Phiri incurred the highest annual cost in tractor operator salaries of K9,597, and the second highest search costs of about K120/client located. Driver salaries were set at 7% commission of revenue. Her total operational costs were at K58,605.3. During the peak season, the hours of tractor operations were increased to 3 shifts, and each driver worked an 8 hour shift. This meant that the tractor was in full operation at all hours of the day. Tractor suppliers and experts indicate that machine downtime is costly on a business because the asset depreciates with time. Therefore many tractor owners are advised to accumulate as much work hours on the tractor as possible. Creating multiple shifts in a day was a strategy Ms. Phiri used to increase the machine's capacity.

¹⁶ Real name has been withheld for confidentiality purposes

Profits

Not only did Ms. Phiri generate the highest revenue, but she also realized the highest operating and net profits. At the end of 2014, operating profit was at K78,494.7, representing a profit margin of 57%, while her net profit was at K21,017.9 representing a net profit margin of 15.33%. This value of her sales were in excess of both the variable costs and loan repayment.

Record Keeping and Audit Practices

One notable attribute about Ms Phiri's case was her knowledge of the day-to-day business operations. She maintained very accurate and updated business records. She also acknowledged that she invested a lot of time in monitoring business operations and conducting regular audits or reviews of the business records. She used the records or information to make decisions, unlike other contractors.

Loan Status

Ms. Phiri is on course with the loan repayment schedule, and has not used any other sources of income apart from the income from service provision to service the loan on the tractor. Not only does she perceive agricultural service provision as a lucrative venture, but has also demonstrated its viability.

Business Outlook and Implications

Ms. Phiri is a classic example of how using sound business principles can lead to high profits for agricultural service contractors. The income she made in 2014 alone was able to pay off half of the total loan on the tractor.

“According to Ms. Phiri, the following are the major reasons for her success: prudent monitoring of business operations, strict record keeping, high asset utilization and high performance by tractor operators which was stimulated by employing commission based remuneration.

Ms. Phiri's performance shows that agricultural service provision in smallholder markets can be very profitable for contractors.