

Case Study

What Are We Promoting?

A Case Study of the Introduction of a New Milling Technology in a Rural Area in Zimbabwe

BRIAN MACGARRY SJ*

ABSTRACT

This case study looks at the introduction to Zimbabwe of a new sorghum milling technology developed in Botswana. This technology, it was assumed, would, by making the processing of small grains less laborious, encourage increased production of these grains. In the analysis of what actually happened in the milling project in one community focus is on the mill as a business enterprise and on issues of community organisation and management. The case study concludes with the view that while there may be a number of non-monetary benefits accruing from the milling project, there has not been a noticeable increase in sorghum production nor is the financial self-sustainability of the mill clear.

Introduction

A project designed to introduce a new milling technology raises questions as to whose development is actually served, and the answers are not entirely simple.

The story began in 1981. Due to personal contacts between the staff of Silveira House and people who had developed and promoted a mechanical sorghum dehuller for installation in rural grinding mills in Botswana, Silveira House was asked if it would be interested in promoting this technology in Zimbabwe. The primary benefit of mechanical dehulling was that it greatly reduced the work involved in preparing meal from sorghum or millet grain. Without it, these grains are much more laborious to process than is maize, and this, it was assumed, was one reason why maize was becoming more popular than these small grains, even in drier regions where it could not give consistently adequate yields and the performance of the small grains is more reliable. The introduction of the dehullers in Botswana had, in a few years, vastly reduced imports of maize (from South Africa) and produced a great increase in the consumption of sorghum meal, thought to be due to the new ease of milling at the village level. Zimbabwe was one of several countries where, it was felt, the dehuller technology could produce similar benefits for people living in more arid regions.

* Research Officer, Silveira House, P O Box 545, Harare, Zimbabwe.

The backers of the programme, Canada's International Development Research Centre (IDRC), envisaged the setting up of one or more mills, fitted with dehullers, in areas where sorghum or millet would be the most suitable crop for the climate. They hoped to observe:

- a) whether the availability of mechanical dehulling influences the preference of rural consumer/producers as between maize and the climatically more suitable sorghum
- b) the economic viability of the project, and
- c) social and technical factors likely to affect its acceptance in the arid regions of Zimbabwe.

IDRC also hoped that the operators of the pilot mill/s would become active promoters of the spread of technology in Zimbabwe. They invited Silveira House to propose sites for pilot mills, and identify persons with sufficient local experience and technical and managerial skill to manage, run and maintain the mill, as well as to spread knowledge of the technology and its benefits, and possibly train intending operators of further such mills. A senior member of Silveira House's agriculture promotion staff identified a site at Sasa business centre, 25 km east of Mutoko in north-east Zimbabwe. He claimed that all the required conditions were met at this site. From the beginning, it later appeared, the project was viewed differently by the promoters and by the community at Sasa, the majority of whom seemed aware only that they had been offered a grinding mill and jobs for some of them running it.

Silveira House had had contact for some time with small cooperative groups of peasant farmers in Mutoko district, and paid a part-time promoter for these groups. There were six groups, all within 10 km of Sasa, in 1981 and the number of groups and the area they covered were both expanding rapidly. The mill was to be run by a cooperative formed by members of these groups. This cooperative would, it was hoped, purchase the mill building and equipment out of income from the mill, thus proving the viability of the project, transferring control of it to the local community, and making the original capital available to repeat the process elsewhere.

Mill operations made a slow start, due to problems of both staffing and equipment for the project. It was thus May 1984 before the first day of grain milling took place on the site, and further technical problems delayed fulltime commercial operation till July of that year.

The development of the project from this point can be considered under three aspects:

1. the effect of introducing the dehuller on production and consumption of small grains around Sasa, and the spread of dehuller technology through the demonstration value of the mill
2. the financial viability and consumer support for the mill as a source of meal (whether of maize, millet or sorghum) for domestic consumption, and
3. the development of community organisation and self-management of the Sasa mill.

Effect on sorghum/millet production and consumption

Although the mill has operated more days per year than its competitors in the neighbourhood, and at lower prices, it has not reversed the decline in production and consumption of small grains. The traditional grain crop, and staple food, in this area was bulrush millet (*mhunga*), but by the time this project was proposed most farmers were growing maize as their staple food

and main cash crop, with enough finger millet (*zviyo*, *rupoko*) for home beer brewing, and very little *mhunga*. Those who were able to irrigate a garden or small field would grow some rice. Sorghum (*mapfunde*) was not grown, except for a sweet variety (*magunde*) grown for its sweet cane, not for its grain, in small gardens.

The presence of the mill did not produce an immediate increase in the amount of *mhunga* being grown or consumed in the area, and did not even stem the decline in production in the first three years of operation. Table 1 summarises the data available for the first 4 years of operation. A similar picture emerges if we consider the weeks in which *mhunga* made up more than 20% of the total grain processed at the mill (Table 2).

These figures show two things about *mhunga* consumption:

- a) It usually peaks in December, since *sadza* (the staple food, a thick porridge eaten with relish) made from *mhunga* is a preferred dish at festive times.
- b) *Mhunga* is still used as a food reserve to some extent. The 1984 grain crop was very poor, so that for most of the first three months of 1985 the mill only worked a four day week, instead of the usual six days, and in this time *mhunga* made up a large proportion of the grain processed.

If the incomplete figures for 1987-8 can be taken to indicate an increase, however slight, in the production and consumption of *mhunga* as compared to maize, the mill is unlikely to have influenced this directly. As can be seen, by this time the dehuller was hardly used at all.

Reasons given by mill customers for not dehulling *mhunga* at the mill, even when they brought it to be ground, were:

- 'double cost' of paying for grinding and again for dehulling (although the cost of grinding *mhunga* rose from 60c per bucket of 18 kg in 1984 to 80c in 1988, the price of dehulling remained 40c/bucket throughout).
- machine dehulled *mhunga* meal did not have the slightly toasted taste of hand-dehulled *mhunga*, which is due to moistening the grain and later drying it over a fire.
- (rarely) too much *mhunga* is lost in dehulling, (although the bran is given back to the customer and used as chicken feed).

The perceived cost seemed to be the reason which carried most weight.

Reasons given for not planting more *mhunga* were:

- *mhunga* suffers much more from the depredations of the quelea birds than does maize
- if *mhunga* is planted in the same field for 2 or 3 years, it exhausts the soil
- low producer price for *mhunga*.

The last two reasons given show that, whereas maize came in as a cash crop and thus was cultivated from the start using artificial fertiliser and pesticides, the local mind-set still sees *mhunga* as a subsistence crop to be cultivated in the traditional way, with no purchased inputs, so yields are low and they soon drop with dropping soil fertility. Income per hectare is therefore low, although the producer price per tonne has been higher than for maize since 1984.

It is interesting to note that the first *mapfunde* (sorghum) milled at Sasa appeared in December 1988. This may be a response to the problem of crop loss to the birds, since sorghum, like millet, requires less rain than maize, but it is less attractive to birds because of the high tannin content in the grain hull.

Sasa mill as a business enterprise

The optimistic picture of great demand for milling in the whole Mutoko district, painted by the Silveira House staff member who proposed that the mill be sited at Sasa, looked less likely when it was observed that Sasa had several business centres each about 5 km distant, and they already had grinding mills. A snap survey of sales of soap, salt, sugar, bread and green vegetables from the two stores at Sasa indicated that only 50 households shopped there. This would mean approximately 230-260 people using Central Statistical Office (1984) data, or possibly 300 people using our own sampling of size of households using the mill. This number would give a maximum grain demand in the expected catchment areas of 115-150 kg/day, or 42-56 tonnes/year, clearly much less than the volume of business recorded in Table 1.

The population estimate is possibly low, as would be the case if many households could not afford to buy the commodities sampled up to our estimate of their requirements, or if they bought significant proportion of them elsewhere, eg in towns. However, one day customer surveys have shown that since mid-1986, over 30% of the mill customers have come from five km or more from the mill, and some of them from within one km of another mill. The Sasa mill is popular, and three reasons can be identified for this:

- It is out of action due to breakdowns for less time than the other mills in the area. Breakdowns cost 24 working days each in 1984-85 and 1985-86, 37 days in 1986-87, and 64 days in 1987-88.
- Milling prices are lower than at other mills in the area. Table 3 lists prices for milling and dehulling per bucket (16.5kg maize, 18kg *rapoko* or *mhunga*) and compares them with the lowest price offered by competitors.
- There is a sense in the community that 'this mill is ours', it belongs to a cooperative of which many members of the community are members, and it is perceived as trying to serve the whole community, and not operate solely for profit.

This last point will be elaborated in the next section, but first we must consider the commercial viability of the enterprise.

The mill is able to employ two operators and pay them a regular wage, which has risen more or less in line with government directives, and to pay all running and maintenance costs. Silveira House, along with an installation team who came from Botswana, subsidised the setting up of the mill by providing skilled labour to direct the installation of the equipment (a more complex task than installing a simple hammer mill), by training the mill operators and by counting routine mechanical maintenance as part of its extension services for the first couple of years. Only the last of these items would distort the balance sheet if it were to be used as a guide to the viability of such a milling enterprise now that the technology is known in Zimbabwe. Even since the cooperative began paying all their own repair and maintenance costs, grinding income has covered all operating costs.

There remains the question of paying for replacement of equipment, or in this case, repaying the initial loan, out of income. The mill machinery and some of the building materials represent a loan of \$10 000 to the cooperative from Silveira House, of which \$2 000 has been repaid to date (May 1989). Against this must be set the fact that cooperative members have contributed a total of \$3 848 as share capital, and a sum of about \$5 000 'disappeared'

during 1986-87. The cause has been identified, and procedures tightened up to make misappropriation of cooperative funds much more difficult in future. A total profit of a few hundred dollars has apparently been banked since January 1988, so, had it not been for this incident, some \$7 000 - 7 500, three-quarters of the initial cost, could have been repaid, roughly half from income and half from share capital.

A number of delays, beyond the control of either the cooperative or Silveira House, between the initiation of the project and its becoming operational, would have made any request for interest payment an undue burden on the cooperative members. Even now, the mill would have difficulty paying interest. However the design of the building was more elaborate, and the dehuller bigger, than was necessary. The whole plan of the mill was standard for a large Tswana village (over 10 000 inhabitants) where grain throughout, and thus income, would be higher than at almost any rural centre in Zimbabwe. A smaller, simpler unit would serve the needs of a community like Sasa and, bringing in the same income for less capital expenditures and lower overheads, could be a financially attractive proposition.

The fact that members are still prepared to contribute share capital with little hope of an early cash dividend shows that they are still happy that their investment brings them benefits - an invisible cash benefit in the form of lower milling costs, and other benefits which may not be assessable at all in financial terms.

Community organisation and self-management

The delays mentioned above, affecting the delivery and installation of equipment, provided useful time in which to adjust the expectations of all concerned in the project to what they could realistically expect out of it. A large part of the Sasa community apparently believed, even after the mill began operating (July 1984, after 3 years of talks, visits and discussions), that they were merely being given a mill to grind their grain and provide jobs for some of their number. The ultimate promoters of the project, IDRC, on the other hand, had very high expectations of the levels of mechanical, managerial and promotional skills that might be found in such a community, and indeed, might be combined in one or two individuals. The Sasa mill was to be a pilot project, to test the economic and technical viability of this dehuller technology under the conditions prevailing in Zimbabwe, to suggest possible modifications in the design of the equipment or operating methods, to propagate knowledge about the new technology available, and to be a centre for training further operators for similar mills. Two mill staff were to be employed. IDRC wanted them to be both technically skilled and experienced as development extension workers, while Silveira House's philosophy emphasised that the two should be the choice of their community for the jobs.

In fact, the two originally chosen, whom I shall call A and B, did both have experience as extension workers with Silveira House, one in agriculture and the other in youth work, but neither could claim much mechanical skill. It turned out that both had been chosen by the Silveira House staff member who had proposed siting the mill at Sasa, even though other staff members had doubts about B's ability to cope with a really responsible job. Shortly after they were selected, A died suddenly. In order to have two trainees to send for a course on using, maintaining and promoting the milling technology in Botswana, the original Silveira House

promoter chose C, a catechist for the local Catholic mission, to replace A. B and C duly attended the course in Botswana, where their trainers rapidly perceived that they would not be able to do much more than run the mill, and reshaped their training course accordingly.

The equipment was supposed to be installed and the operators to begin work as soon as possible after their return, but then the delays began.

In order to be able to drive either a hammer mill or the dehuller separately, or the two together, and to change between these possibilities without stopping the engine, the diesel engine needed to be fitted with a clutch. This is not required for the standard diesel engine and hammermill set used in rural grinding mills, nor for the other uses, such as water pumping, to which this type of engine is usually put in Zimbabwe. Separate arrangements, therefore, needed to be made to import a clutch. Finding one, ordering it, and arranging shipping and customs clearance, took about two years. This meant that when the trainee operators returned from Botswana in July 1982 there was no mill for them to operate, but also that the community had some time in which to consider whether, and how far, they could meet IDRC's expectations on monitoring the project and promoting its wider dissemination. At first the community asked to have a manager appointed for the mill, but before one could be found popular support had swung behind operator B for the job. During 1983 the project marked time, a committee was chosen by the community to oversee the running of the mill, and it seemed advisable to pay a variable monthly sum to B and C out of project promotion funds as a retainer. The sum was intentionally variable from month to month. No contract had been entered into that would entitle B and C to a regular salary before there was work for them, nor oblige them to wait for that work, but this payment was meant to make it easier for them to wait. After about a year of this arrangement, B began demanding further payments, including a sum 'in lieu of leave'. This convinced the community of his unsuitability for the job, and, led by the new committee, they elected D, a local farmer, whose main qualifications for the job were a great capacity for hard work and sound common sense. C and D were thus the designated mill operators who welcomed an installation and training team from Botswana in May 1984. Further minor technical adjustments meant that commercial operation only started on 20th July 1984.

At this time a manager still had not been found, so it was agreed that staff from Silveira House would help monitor the mill's operation. The mill operators agreed to record separately the daily income from grinding maize, *mhunga* and other grains (in practice, 'other' grains meant *rupoko* or *chimera*, a mixture of malted *rupoko* and maize for brewing) and from dehulling *mhunga*, as well as daily diesel consumption. Occasional visits from the Centre were made to collect this data and to make some measurements to determine optimum operating conditions (retention time and size of load) for the dehuller. On such visits customer surveys were also sometimes carried out, to give the weight of each load of grain processed that day, the distance it was brought to the mill, the size of the customer's household and how often they came to the mill.

A separate manager, with the time and skill to undertake wider promotion work for the dehuller, was never found. A possible candidate was employed for a short time, but proved unsuitable and no one else could be found locally. The community were unwilling to accept an outsider in this capacity.

Until 1987, although the mill income was being used to pay for fuel, operators' salaries and repairs, this was done in the accounts books of Silveira House, with the mill operators only recording income, and therefore not being as immediately aware of expenditure. This system had its weaknesses, as when the \$5 000 disappeared, on its way from Sasa to Silveira House, between January 1986 and May 1987. Handing over full control to the mill committee reduced the chance of a repetition of the disappearance, by making all financial operations more open to inspection and checks by cooperative members. In early 1987, the cooperative opened a bank account, into which income was paid. In June they began paying the mill operators' salaries directly from this account, and from the end of July they began ordering their bulk diesel fuel and lubricating oil supplies and paying directly from their account. Finally, in September, they contracted with a mechanic, from some distance (due to lack of skills locally), for maintenance and repairs, whom they paid directly.

By 1987 the community finally grasped the implications of the loan agreement under which the mill had been set. They had requested from Silveira House, and received, training on cooperative principles and management. They became more serious about collecting joining fees and share capital from cooperative members and this proceeded faster after a new committee had been elected to replace the one chosen in 1983. The 1987 election was accompanied by complaints about misuse of money, but, strangely, inadequate accounting for a few hundred dollars spent on food for an opening ceremony and lunch, and other occasions, from committee members at the mill caused more of a stir than the apparent direct theft of \$5 000. It was only when the cooperative began paying their own bills directly that they started keeping records of expenditure, but once they did the rate of members' contributions to the cooperative picked up. By May 1989, 14 members had each paid their full \$200 share and another 13 had contributed a total of \$1 048 as part shares varying from \$20 to \$140. The present committee has served for nearly two years, but there are indications that members will want some changes in 1989.

In 1988, as they took full control of their financial management, the committee decided that, while recording all expenditure in the cashbook kept at the mill was essential, recording the income from processing each kind of grain separately was not, so it will not be possible to compare the quantities of different grains processed as fully as was done for 1984-87, but the mill will run well enough without that information. Spot customer surveys, taking account of seasonal variations in *mhunga* supply and consumption, can indicate large changes in planting and consumption patterns, but the mill committee declined to take on the job of doing these surveys.

Conclusion

The introduction of the mechanical dehuller has not noticeably caused any swing back to growing and consuming *mhunga* in this community. Whether, even without any financial malpractice, this mill could be fully financially self-sustaining is still an open question, though altering the plan of the building and equipment for any similar mill in future would reduce costs without reducing income and thus improve the situation. The decisive factor at Sasa is the deep loyalty of the whole community, even non-members of the cooperative, to their mill. An article

like this might have missed some of the non-monetary benefits that should be taken into account beside the apparent financial loss, but the users have drawn up their balance sheet, and on theirs they are gaining from having the mill.

From studying the operation of this mill, it seems most likely that the best that rural grinding mills usually can achieve is to cover running costs and simple maintenance and repairs, but accumulating funds to eventually replace the equipment is probably beyond their capacity. No example comes to mind that would contradict this statement. On the other hand, the continuing strong community support for the Sasa mill, and the knowledge that costs can be reduced in future mills, has induced Silveira House to help at least one more community who asked for assistance to set up a cooperative maize grinding mill to get a loan to start their business.

References

- Central Statistical Office (1984) 1982 Population Census, A Preliminary Assessment, Harare.
- Zimbabwe National Household Survey Capability Programme (1985) Report on the Demographic Socio-Economic Survey, Communal Land of Mashonaland East Province 1983/4, CSO, Harare.

Table 1
***Mhunga* processed at Sasa Mill, 1/10/84 - 30/09/88**
absolute quantities and as proportion of all grains

Dates	Total Grain processed tonnes	<i>Mhunga</i> Milled % of tonnes total		Dehulled % of tonnes total	
1/10/84-30/9/85	279	18	6,5	5,0	1,8
1/10/85-30/9/86	364	12	3,3	2,6	0,7
1/10/86-30/9/87	211	13	6,2	0,9	0,4
1/10/87-30/9/88*	203	>11	>5,4	(negligible)	

* for part of the year millers did not differentiate *mhunga* from other grains in their records.

Table 2
Weeks when *mhunga* accounted for more than 20% of business
at Sasa Mill, October 1984 - December 1988*

Week beginning	<i>Mhunga</i> as % of total grain processed
17 December 1984	27,2
31 December 1984	28,4
7 January 1985	29,9
14 January	24,8
21 January	26,8
28 January	30,4
11 February	20,8
18 February	22,6
25 February	20,3
18 March	20,0
15 December 1986	22,2
22 December	29,1
2 May 1988	31,4*
19 December 1988	>20,0*

* *Mhunga* was not recorded separately from other grains processed January - June 1988, except the one week shown here, nor on the last three days (30% of the week's business) before Christmas 1988.

Table 3
Milling charges at Sasa

Dates	Dehulling <i>mhunga</i> /bkt	Hammer <i>mhunga</i>	Milling/Bucket <i>rupoko</i>	maize	Nearest competitor maize/bkt
May '84 - 31/12/85	40c	60c	45c	45c	50c
1/ 1/86 - 17/10/87	40c	65c	50c	50c	60c
19/10/87 - 30/06/88	40c	70c	60c	60c	80c
2/07/88 -	40c	80c	75c	75c	90c