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CHAPTER SEVEN

PROFITABILITY ANALYSIS OF COTTON PRODUCTION IN MOUTSE AND NKOMAZI, MPUMALANGA PROVINCE

7.1 Introduction

South African agriculture has undergone a massive restructuring since 1996. Prior to 1996, major agricultural products (including cotton) were regulated by the agricultural marketing boards. These boards were, *inter alia*, responsible for setting of price floors. Agricultural production was not exposed to international competitive market forces. Although some deregulation occurred with some products since the late 1980's, the system remained a regulated system; cotton did not experience deregulation. The repeal of the marketing Act (1968) and the promulgation of the Marketing of Agricultural Product Act (1996) changed the scene. From 1996 agriculture, in general, was subject to a process of deregulation, tying most products to world markets. The dismantling of marketing boards (including Cotton Board) together with decreases in tariffs and non-tariff barriers has meant that prices, including cotton prices, are nowadays much more tied to international prices. A heated and highly contentious issue in this regard is the agricultural subsidies the USA gives to their cotton farmers. Although subsidisation leads to especially low prices for consumers, such subsidisation has distorted the world markets, depressing prices for producers in the rest of the world, including practically all the developing countries.
As a result, the profitability of cotton production in the developing countries like South Africa has been under some serious debate in the recent past. This debate coincides with the revitalisation of the South African small-scale cotton industry in particular.

This chapter evaluates the profitability of smallholder cotton producers in the sample regions. The purpose of the analysis is to support producers and planners by providing empirical evidence of the profitability of cotton and also to use the results in an appropriate management decision model. Section two presents the methodology and data limitations. Section 3 examines the costs of production incurred by emerging cotton producers in the study zones and this is followed by a discussion of the results of the gross margin (GM) analysis. The study proceeds with a sensitivity analysis. Section 7 discusses the result of break-even analysis (BEA), followed by major constraints limiting cotton production as expressed by some emerging cotton growers. Constraint analysis, *inter alia*, helps one to understand why small-scale cotton production performs the way it does. The chapter concludes with some recommendations.

7.2 Data Limitations and Methodology

The data analysed in this section refers to the data collected from the sample farmers who grew cotton in the 2001/02 production season. As shown in chapter 4, 98 and 55 sample farmers grew cotton in Nkomazi and Moutse respectively. One should keep in mind that the reliability of both income and costs data is always questionable in small-scale agriculture where record keeping is limited. Low levels of education as well as lack of aptitudes for managing farming as a business do not lead to adequate incentives for farmers to keep and maintain farm records. To partially deal with this problem data from the MPDA, Land Bank and Clark Cotton was also used to supplement data from sample cotton farmers. In addition, data provided by farmers was verified with key informants where necessary. Given the absence of irrigation, rainfall quantity and its distribution within the cropping season is essential to cotton production in the study areas. In this context, analysis of data from a single season needs to be viewed with caution.

The financial analysis measuring the profitability of the cotton industry will be conducted within the gross margin (GM) approach. Where scanty information exists, GM is more suitable because it does not require more comprehensive budgeting techniques. GM measures the efficiency with which variable costs inputs are converted into output and its calculations does not include fixed cost. Compared with variable costs, changes to fixed costs are irregular and lumpy, and to allocate it to single enterprises is difficult and arbitrary. Usually when a farmer examines the profitability of an enterprise (s)he is faced with a problem of how to allocate both variable and fixed costs. If good records are kept the farmer must be able to establish the cost of input for each enterprise. However, in a mixed farming economy and especially if a multiple cropping system are used, farm resources such as rent, permanent labour etc are shared between the various enterprises and it is usually difficult or even practically impossible to work out the economic cost of the share used by a particular enterprises or crop within a multiple cropping system. The GM concept was introduced to circumvent the problem of dealing with fixed cost when calculating the relative profitability of the enterprise (Buckett, 1988). GM does not consider price and yield risk. Sensitivity analysis will therefore be conducted to illustrate the effects of yield and price variations.

Break-even analysis (BEA) will be conducted to supplement the GM analysis. BEA will be applied mainly to evaluate the financial viability of the small-scale cotton industry. It is a powerful decision making tool in determining the cost recovery price, level of production and profit.

7.3 Cost of Production

Sample cotton farmers buy most of their inputs. The majority of the respondents in Moutse (91%) and Nkomazi (77%) buy their inputs from the co-operatives and Vunisa respectively. The main source of credit is Land Bank as mentioned by 69 and 97% of cotton growers in Moutse and Nkomazi respectively. However, some cotton growers particularly in Nkomazi mentioned Vunisa as their main source of credit. This needs further clarification because as explained in Chapter 4 Vunisa acts as an agent for the Land Bank. The loans offered to the farmers need to be repaid with interest (18%) at the end of the production season.

At the time of the survey the Nelspruit branch of Land Bank was prepared to offer production loans for the 2003/04 production season to the amount of R1350/ha. But, as a risk management strategy the bank revealed to the creditworthy farmers the production loan to the amount of R1000/ha. The balance withheld was going to be released only when absolutely necessary. In addition, this branch was reluctant to finance inputs (e.g. wages) that were under the direct control of the farmers. This was done to minimise the unintended use of credit. The bank was only going to pay directly to the input suppliers based on the invoices submitted. Major inputs used by the cotton growers in the study areas will now be discussed.

7.3.1 Cotton Seed

Sample farmers planted cotton seed bought from Vunisa. At least 1% of cotton growers bought cotton seed from Delta Pineland (seed company) in Groblersdal. The cotton seed variety applied is the GM cotton (NuCOTN 37-B with Bollgard™). Monsanto owns the Bt gene and Delta Pineland developed the Bt NuCOTN 37-B cotton variety that contains the Bt gene. This cotton variety is preferred by some cotton growers for the following reasons:

- It requires less insecticides application (58%)[1]
- It offers high yield (10%)
- It has labor saving properties (8%)

The adoption of Bt-cotton impacts on farm income mainly in three ways (Kirsten, Gouse and Jenkins, 2002):

- Decreased input costs through savings on pesticides chemicals and application costs;
- Increased input costs through higher seed price and additional technology fee and
- Increases in yield

Interesting to note is that at least one cotton grower used the Delta Opal RR cotton variety. The main difference between the two varieties is that the former (NuCOTN 37-B with bollgard) is tolerant to insects (bollworm) while the latter is tolerant to weeds. There is a newly developed cotton seed variety (known as NuOpal RR) that possess both of the aforementioned traits. Although this appears to be a great technological discovery, this variety has

[1] Figures in brackets refers to the number of respondents and does not add up to 100 as some cotton growers did not give reasons

not yet been released for public consumption. It appears that the national government is reluctant to approve its public use for safety reasons. This variety has a great potential of increasing the profitability of small-scale cotton producers (Macaskill, 2004).

The amount of seed applied per unit differs according to the planting methods. Manual planting is more efficient than mechanical planting applied by Moutse cotton growers. Nkomazi sample cotton growers apply Bt cotton variety at an average seed rate of 5kg/ha as opposed to the Moutse average seeding rate of 10kg/ha. Mechanical planting is applied despite the Department of Agriculture's advice of manual planting. Seeds are usually packaged in 25kg that retails at R883.50

7.3.2 Fertiliser

Fertiliser is used only by Moutse cotton growers. Of Moutse cotton growers, 93% used fertiliser bought at an average price of R105 per 50kg bag. Farmers indicated using almost 2 X 50 kg of fertiliser (2:3:1/3:2:1) per hectare. Thus, it cost sample farmers about R210 to fertilise a hectare of cotton. In addition farmers apply 2 bags of LAN fertiliser/ha at a cost of R95/bag.

7.3.3 Ploughing and planting

Ploughing is done by tractors at a cost of R300/ha. In areas such as Moutse ploughing is followed by discing which cost R200/ha. As mentioned previously in Moutse planting is done mechanically at a cost of R200/ha.

Depending on the rainfall of the region, the optimal planting time for cotton ranges from mid-October to mid November. Sample cotton growers indicated ploughing and planting of cotton around these times with the majority (48%) doing it mid October. Farmers usually plant the crop just after the rain, that is, between October to February. In worst cases cotton is also planted in mid December especially when the rains are late. The results of delayed planting means that the crop is planted after the optimum planting date and a much lower yield can thus be expected. Lower yields subsequently affect the profitability of the crop.

7.3.4 Labour

Activities on the farm are carried out by family members along with some hired labour. All cotton growers in Nkomazi and 45% in Moutse indicated making use of casual labour. With the exception of planting in Moutse, casual labour is employed to perform the following farm activities: weeding, spraying and harvesting. The demand for casual labour varies by the farm activity, farm size and gender. For instance, harvesting is more labour intensive than weeding while spraying is a laborious task performed mainly by energetic males. In addition the rates paid for casual labour varies considerably both within and between regions. However it appears that casual labourers in Moutse are highly paid relative to Nkomazi casual labourers. For example, the amount of money earned for weeding by Nkomazi casual labourers varies between R10-15/day while in Moutse it varies between R14-20/day. Wage differentials are probably indicative of labour availability between the two regions.

The number of days taken to complete a particular activity is determined by the number of casual labourers employed. While cotton has a growing span of 6 to 7 months, casual labourers are usually employed for a maximum number of three months. Typically, it takes two labourers, family and hired, to work a hectare of cotton. Family labour does not represent a direct cost to the family and was measured in terms of the opportunity costs.

According to Strassberg (1997) there are three methods to value the opportunity cost of family labour

- The official minimum wage or some proportion thereof
- The wage rate at which sampled households sold labour off-farm and
- The wage rate at which non family labour was hired by households in the sample for employment on their cotton fields

Relying on minimum wage poses two theoretical disadvantages. First, it does not reflect the true scarcity value of labour within the rural economy, particularly if there are statutory minimum wages, as in some sectors, including agriculture and domestic services in South Africa. Method two represents a reasonable alternative, in that it would capture for each household the rate at which it actually sold labour off-farm; however, limited off-farm employment opportunities and skills levels of the sample farms argue against its use. Therefore, method 3 is used in this study as it offers two advantages. First, it assumes that if sampled households attempted to sell their labour they would have received approximately the same wage that sampled households actually paid to non-family labour. This assumption holds true in the sampled regions as some farmers do trade their labour to other fellow farmers. Secondly, it allows seasonal and regional differences to be implicitly incorporated.

The undermentioned are the farm activities, costs and their respective labour requirements.

Planting – it takes about a day to plant a hectare of cotton in Nkomazi. Planting is done on the rows done by the tractors. Drawing lines by a tractor cost R120/ha. As explained above, the standard rates paid to casual labourers vary between R10-15/day in Nkomazi.

Weeding – the number of times weeding is done is influenced by the amount of rain in a particular year. In times of normal rains weeding can be done twice. It normally takes about 10 days for two labourers to complete weeding a hectare of cotton. Weeds do affect the quality of seed cotton and subsequently the price farmers get. Thus, weeding is one of the most critical stages of cotton production.

Spraying – as mentioned above, spraying is a laborious and gender sensitive task. As a result its wage rates are relatively higher than for other farming activities. In Nkomazi casual labourers earn R20/day for spraying while in Moutse they earn a relatively higher amount of R50/hectare for all the spraying done. Currently farmers spray a maximum of three times per growing season. The adoption of Bt cotton seed variety has reduced the number of spraying. Unfortunately the data does not allow quantification of the gain as a result of less spraying. Reduced chemical application saves labour. It normally takes a day for a labourer to spray a hectare of cotton.

Harvesting – cotton harvesting under small-scale production is done by hand. Hand picked cotton is of higher quality than mechanically picked cotton. Hand picking reduces the incidence of stains and impurities. Cotton harvesting is more labour intensive than any other cotton production activity. Cotton is usually harvested in April and it is usually around this time that the demand for labour is greatest. Harvesting needs to be done promptly before it rains as rain affects the quality of seed cotton negatively. As a result some households also make use of school children during this time. What still remains to be seen is the effects of enforcement of the Basic Conditions of Employment Act (1997) that, *inter alia*, prohibits the employment of children and forced labour.

The amount of money paid to casual labour for cotton harvesting varies but the standard rate prevailing in the sample region is fifty cents per kg. It is fairly challenging to determine the number of days it takes for a pair of labourers to harvest a hectare of cotton. Complicating this is that the number of workers hired for harvesting varies considerably amongst sample households. However, informal discussion with key informants as well as secondary sources indicate that it takes about three weeks for a pair of labourers to harvest a hectare of cotton. Several factors influence the duration of cotton harvesting; the size of the plant, age of harvesters, and amount of rainfall. In this study, labour costs for harvesting was computed on the basis of the total seed cotton produced per hectare multiplied by the prevailing harvest rate (R0.50/kg).

7.3.5 Pesticides

Pesticides are applied to control major pests such as bollworm complex and cotton aphids. At Nkomazi, 97% of cotton growers indicated the use of pesticides compared to 62% at Moutse. Monostem and Cypermethrin are the commonly used pesticides in the sample region. Applications of these pesticides depend on the level of infestation. Monostem is a systematic insecticide for the control of red, spiny and American Bollworm, aphids and red mites. Application takes place as soon as infestation is noted following regular inspection. Cypermethrin is aimed at controlling predominantly Bollworm and it is usually used during the period of peak flowering until boll spit (Ismael *et al*, 2000). These pesticides are sold in litres, are mixed with water and snapsacks are required for spraying. It cost R99.21 and R15.16/ha for spraying Cypermethrin and Monostem respectively.

In addition to the use of pesticides, some sample farmers also reduce pest population by burning the cotton hay after harvest. This is done primarily to reduce pest population for the following growing season. Cutting and burning of cotton hay is prevalent in Nkomazi and practiced by 97% of cotton growers in that region as opposed to only 5% in Moutse. The remaining percentage of the sample cotton growers leaves it on the field for grazing.

7.3.6 Transport costs

Ginners usually provide transport for bales produced when there is enough bales output of seed cotton. For the production season under review, sample cotton growers in Moutse indicated that they have used their own transport to the gin (average distance is 45Km). In Nkomazi farmers transport their bales to the depot that on average is approximately 10km from the farmers' fields. Contrary to expectation, transport cost is usually charged per bale delivered instead of kilometres travelled. The transport costs that sample households pay vary considerably mainly because individual households do negotiate their own transport costs with transport owners. In Nkomazi the average price per bale is R24 while in Moutse it is R16.

7.3.7 Picking cost

Other costs that farmers incur related to picking cost involve the plastic and bale bags that they use when harvesting. These bags are supplied by ginners. Plastic bags cost R1.50 and farmers use only 3 bags per hectare. Bale bags on the other hand cost R40/bag, but farmers get refunded after harvest when they return them. Alternatively, farmers without cash to purchase bale bags get them on loan on condition that they have seed cotton ready to be harvested.

7.4 Results and Discussion

Table 7.1 highlights a concise measure of the profitability analysis showing both average revenue and costs. Moutse sample cotton growers obtained an average yield of 973kg/ha which is 44% higher than the Nkomazi average yield of 549kg/ha. In bale terms, seed cotton produced translates into 5 and 3 bales in Moutse and Nkomazi respectively. Nkomazi is regarded as a more suitable region for cotton production than Moutse. Reasons that can be advanced for this paradox is that, firstly, observed relative low yields in Nkomazi can be attributed probably to unfavourable climatic conditions in the production year under review. Secondly, the application of fertiliser in Moutse has probably boosted cotton production. It appears that sample cotton growers produced seed cotton of similar quality/grade (HA grade) as represented by the average price per unit (R3.65/kg) received. Moutse sample cotton growers' gross income averaged R3550/ha compared to average of R2004/ha for Nkomazi cotton growers.

The mean total operating costs is R2480/ha for Moutse and R1441/ha for Nkomazi. Costs were divided into two components namely, pre-harvest, and harvest and marketing costs. Pre-harvest costs constitute about 76% of the total operating costs. Labour costs were calculated using the maximum rate prevailing in the region. The reason for this is that, firstly, hired labourers are aware of the prevailing rates that exist in their respective regions and as such are not willing to settle for lower rates. Secondly, sample farmers associate maximum rates with better quality work.

Table 7.1 Profitability Analysis of Cotton Production in Moutse and Nkomazi, 2001/02

Description	Moutse				Nkomazi			
	Unit	Cost/unit (R)	Quantity	Value or Cost/ha (R)	Unit	Cost/unit (R)	Quantity	Value or Cost/ha (R)
Gross Income	Kg	3.65	973	**3551**	kg	3.65	549	**2004**
ALLOCATED COSTS								
Pre Harvest								
Seeds (Bollgard)	kg	35	10	353	kg	35	5	175
Ploughing	ha	300	1	300	ha	300	1	300
Discing (Drawing lines)	ha	200	1	200	ha	120	1	120
Planting	ha	200	1	200	ha	15	2	30
Fertliser (2:3:1)	kg	105	2	210				0
LAN	kg	95	2	190				0
Weeding	ha	150	2	300	ha	150	2	300
Herbicides (Monostem and Cypermethrin)	L	105.27	1	105	L	105.27	1	105
Spraying	ha	50	1	50	ha	20	3	60
Total Pre-Harvest Costs/Ha				**1909**				**1090**
Harvest and Marketing Costs								
Harvesting	kg	0.5	973	487	kg	0.5	549	275
Plastic bags	Bag	1.5	3	5		1.5	3	5
Transport	Bales	16	5	80	bales	24	3	72
Total Harvest Costs/Ha				**571**				**351**
Total Allocated Costs/Ha				**2480**				**1441**
GROSS MARGIN/Ha				**1072**				**563**

Note: 1 bale = 200kg

On aggregate, average costs of production in Moutse are 42% higher relative to the costs of production in Nkomazi. Differences in costs of production between the sample regions lie largely in the pre-harvest activities and methods applied. For instance, the cost of planting in Moutse region is 85% higher than the planting cost in Nkomazi. Manual planting can significantly reduce the cost of production and subsequently increase the profitability of cotton production. Furthermore, manual labour has an additional advantage of reducing the amount of seeds required per unit. Cost of seeds in Moutse is 50% higher than the cost of seeds in Nkomazi.

Per unit costs of production (i.e. total enterprise cost divided by the average yield) for sample Moutse cotton growers amount to R2.55/kg compared to R2.62/kg for Nkomazi sample cotton growers. At the current seed cotton price received, for every kg of seed cotton produced sample cotton growers make a gross margin of R1.10/kg and R1.03/kg in Moutse and Nkomazi respectively. The gross margin/ha for sample cotton growers is R1 072/ha and R563/ha in Moutse and Nkomazi respectively. The average gross margin/ha in the sample region is R818.

According to Morris and Meek (1980: 65) monetary values must be used with caution. Numerical values obtained in financial/economic analysis should be seen principally as a basis for ranking strategies, regions etc, and not as representing the actual benefit which will be achieved under all circumstances.

There are three main critical variables that influence the profitability of cotton production namely, production levels, costs, technology available and price as influenced by the quality of seed cotton produced. The next section will explore the effects of a change in production levels and prices of seed cotton to the GM.

7.6 Sensitivity Analysis

The results presented in Table 7.2 are subject to debate. As mentioned previously, Moutse is regarded as a marginal cotton producing area with a low production potential compared to Nkomazi. Under normal circumstances/years a hectare of cotton produces 1000kg and 1800kg of seed cotton in Moutse and Nkomazi respectively (Anthony, 2003: Macaskill, 2004). Thus, the observed seed cotton production from the survey is lower and contrary to the general knowledge and expectation. Under normal circumstances therefore sample cotton growers in Moutse would have realised a gross margin of R1 157/ha compared to R4 359/ha in Nkomazi.

Using production data from the normal years, sensitivity analysis will therefore test the robustness of smallholder profitability indicators to changes in key variable parameters. The results of the sensitivity analysis will be reported mainly for changes in the production level per hectare as well as in the quality of seed cotton produced. These variables are responsive, *inter alia*, to weather related risk and farmers' management capabilities. The undermentioned are the scenarios under which sensitivity analysis will be performed.

1. Dry weather conditions (drought), holding price and pre-harvest cost constant (bad year)
2. Normal weather conditions holding price and pre-harvest costs constant (good year).
3. Dry weather conditions accompanied with bad crop management

An optimal way to perform the sensitivity analysis would have been to perform a regression analysis of factors affecting production levels, for example rainfall and temperature. A regression model of time series data of production given rainfall and temperature would have given an indication of the actual level of production changes over changes in rainfall and temperature. However, lack of time series data on small-scale production levels precluded the performance of the analysis.

Therefore, the results of the sensitivity analysis for scenario 1 and 2 are reported with respect to ±50% change in cotton yield holding pre-harvest costs and yield price constant. Cotton prices are fixed by Cotton South Africa and vary according to grades. Table 7.2 shows changes in GM to changes in production levels and quality of seed cotton. In good years, changes in GM increases at a decreasing rate. This is indicative of the limited production capacity that a hectare of cotton can produce. In bad years, GM begins to fall below zero when production falls by 40% in Moutse. The magnitude of the loss is R71/ha in Moutse. The size of the loss could be minimised by reducing the costs of production that are relatively higher in Moutse.

Table 7.2 Sensitivity Analysis on Gross Margin with Changing Cotton Yield and Price (GM/ha in rand)

	Scenario 1 (bad year)					Scenario 2 (good year)				
Prod change (%)	-10	-20	-30	-40	-50	+10	+20	+30	+40	+50
Moutse (GM)	850	543	236	-71	-378	1 464	1 771	2 078	2 385	2 692
Nkomazi (GM)	3 814	3 268	2 723	2 178	1 632	4 905	5 450	5 995	6 541	7 086
Scenario 3										
Lint prices by grades (R/kg)	3.79 (HX)	3.50 (HB)	3.19 (HC)	2.90 (HD)	2.10 (BSG)					
Moutse (GM)	1 297	1 007	697	407	-393					
Nkomazi (GM)	4 611	4 089	3 531	3 009	1 569					

Survey results indicate that sample cotton growers produced cotton of grade HA (R3.65/kg). The quality of seed cotton determines the price ginners pay to the farmers. Results of Scenario 3 shown in Table 7.2 show effects of seed cotton quality on GM, holding both yield and operating cost constant. In Moutse GM falls below zero when sample cotton growers produce cotton of grade BSG (below standard grade). Thus, producing cotton of a higher quality is imperative particularly under dryland conditions where production is erratic.

7.7 Break-Even Analysis (BEA)

BEA is a financial analysis tool that provides one of the most useful decision models for financial management decision. According to Kannapiran (2001) it facilitates decision making in the short term, although long term and strategic decisions can also be based on BEA. In addition it can assist in making investment decisions that are both technically and financially sound. Break even point is simply the level of sales that a farm business must generate to achieve zero profit and / or zero loss. That is, the break even point units indicate the level of sales that are required to cover costs. It is important, however, to realise that a farm business will not necessarily produce a product just because it is expected to break even. A certain level of profitability is desired. This level of productivity will be at least the opportunity cost involved in using the available resources for the production of the product concerned.

There are various basic assumptions used in BEA and some of the assumptions are mentioned below

- Costs can be divided into fixed and variable costs
- Total variable costs are proportional to volume
- Sales and production are equal
- The relationship of sales and costs is linear over the relevant range
- The sale price does not change over the relevant range
- Total fixed costs remain the same over the relevant range

At break-even point, total revenue (TR) is equal to total costs (TC)

$$TR = TC \qquad (1)$$

$$TR = P \times Q \qquad (2)$$

$$TC = FC + VC \times Q \qquad (3)$$

$$P \times Q = FC + (VC \times Q) \qquad (4)$$

Where Q is the quantity produced and sold and P is the sales price per unit produced or sold. FC is the fixed costs for the farm enterprise and VC is the variable cost per unit of production or sale. Equation 4 can be articulated in a variety of ways to evaluate choices for strategic and operational decision making in an enterprise. To determine production decisions, equation 4 need to be solved for Q and it yields the following:

$$Q = FC/(P - VC) \qquad (5)$$

Sample farmers have limited FC applicable to their farming operation. The FC faced by a significant number of small sample cotton growers is the amount of loan (plus interest) borrowed from the Land Bank. The average amount of loan is R800/ha in Nkomazi and R1000/ha in Moutse. Other information used for the computation of break-even point is the one derived from Table 6.1.

Table 7.3 Results of Break-Even Analysis to Determine Break-Even yields (per ha) for Emerging Cotton Producers in Moutse and Nkomazi, 2001/02 (Kg)

P/kg (per bale)	3.79 (758)	3.65 (730)	3.50(700)	3.19 (638)	2.90 (580)
Moutse	952 (5)	1073 (5)	1242 (6)	1844 (9)	3371 (17)
Nkomazi	807 (4)	917 (5)	1073 (5)	1656 (8)	3371 (17)
Average	880 (5)	995 (5)	1158 (6)	1750 (9)	3371 (7)

*Figures in parenthesis are in bale terms while those outside are in kilograms on per hectare basis

Table 7.3 above reflects the results of the BEA of the emerging cotton producers in the study zones. Using the formula explained earlier, for example, when price is set at 3.65/kg (i.e. farmers produce seed cotton of grade HA) the break-even quantity for Moutse and Nkomazi cotton growers is estimated to be 1073 and 917kg per hectare of seed cotton respectively. This translates into 5 bales/ha as shown in Table 7.3. This situation is further illustrated in Figure 7.1 and 7.2. In essence, the break-even point indicates the level of sales that are required to cover the costs. Thus, at this point no profits is made and no loss is incurred. An important observation to be noted from Table 7.3 is that when seed cotton price declines large quantities of seed cotton have to be produced to break-even, *ceteris paribus*.

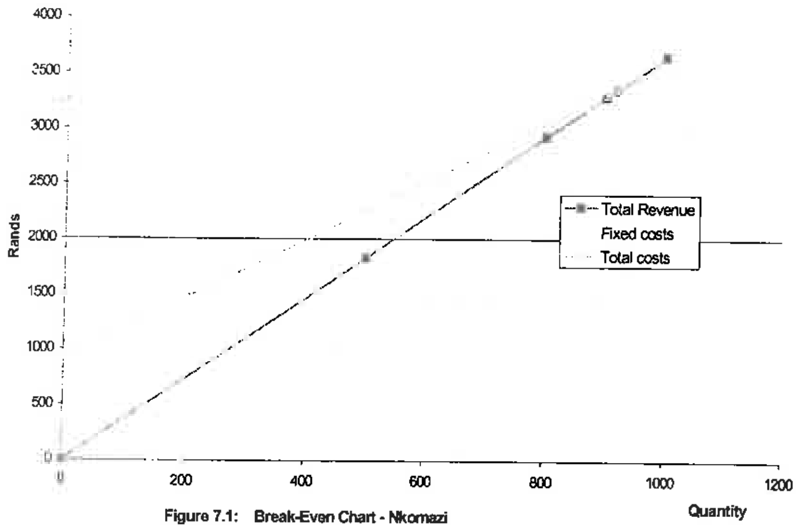

Figure 7.1: Break-Even Chart - Nkomazi

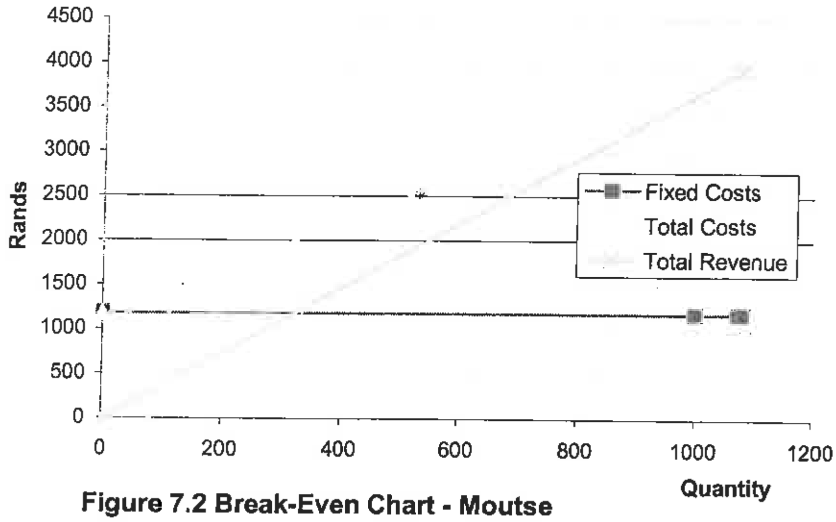

Figure 7.2 Break-Even Chart - Moutse

Farmers were asked to indicate the amount of money that they have saved from cotton sales. Respectively, 89 and 87% of the sample cotton growers in Moutse and Nkomazi indicated to have saved the money in the bank. The average amount of money saved is R1 248 and R480/ ha in Moutse and Nkomazi respectively. These results are puzzling considering that sample cotton growers appear to be operating below the break-even point and it is probably an indication of the non-repayment culture reported by Delta Pine and Land Bank[2]. If this is true, further studies need to be conducted to identify characteristics of defaulting farmers and evaluate strategies to overcome the problem.

Important to note from Table 7.3 is that the break-even point is not static. In many instances, the selling price, fixed costs and variable costs will not remain constant resulting in a change in the break-even. So a break-even cannot be calculated only once. It should be calculated on a regular basis to reflect changes in costs and prices and in order to maintain profitability or make adjustment in the product line.

Finally, the cotton industry envisages establishing new cotton small-scale producers. In addition, Da Gama Textiles, a leading textile manufacturer based in the Eastern Cape, is examining the feasibility of undertaking cotton production in four districts in the Eastern Cape Province, namely Addo, Cradock, Qamata and Tyefu. BEA is one of the most common tools used in evaluating the economic feasibility of a new enterprise or venture. In most instances, success takes time. Many new enterprises and products actually operate at a loss in the early stages of development. Knowing the price or volume necessary to break-even is critical especially in evaluating the time frame in which losses are permissible.

7.8 Major Limiting Factors to Cotton Production

The cotton industry and policy makers are currently searching for feasible strategies to increase the number of cotton producers and the quantity produced particularly by smallholder farmers. To help inform this process, one of the relevant questions to ask is why some regions or smallholders within a region get significantly higher yields than others as shown in the previous section. Table 7.4 highlights some of the major constraints limiting cotton production as seen through the eyes of the surveyed farmers.

[2] Important to note is that Land Bank does not take into account the opportunity cost of family labour in their lending operations

Table 7.4 Constraints to Cotton Production expressed by Sample Farmers

	Moutse N=40	*Nkomazi N=98*	*Average*
		%	
Lack of farming equipment	28	2	15
Credit	10	8	9
Transport	10	-	5
Insufficient rainfall (drought)	33	82	57
Insects, pests and diseases	15	8	12
Illiteracy	5	-	3

Table 7.4 shows that limiting factors vary by regions, but the most pressing constraint limiting cotton production in both regions seems to be insufficient rainfall (drought) as expressed by a larger proportion of the sample cotton growers (57%). Insufficient rainfall has a devastating consequence as it leads, *inter alia*, to erratic, low and sometimes zero production. Lack of equipment is the second largest constraint limiting cotton production in Moutse as indicated by 28% of sample cotton growers. Tractors are the commonly stated equipment that is lacking. Thus, smallholders with relatively high yields may reach this yield because they have access to production inputs in a timely fashion, while others do not. The cotton industry and the government may want to target programs towards assets or inputs where farmers indicate problems, thereby increasing yields and total output without necessarily land expansion.

A striking constraint noticeable in Moutse is the illiteracy problem. This result is puzzling as one would have expected Nkomazi farmers to be more aware of illiteracy problems as the majority of respondents (44%) in that region had no formal schooling compared to 36% of Moutse farmers. Informal discussion with some farmers in Nkomazi revealed that school children do assist their parents (farmers) with written instruction or by reading the agricultural information. In addition, some farmers in Nkomazi prefer to receive written agricultural information for future references. The illiteracy problem may, *inter alia*, imply huge difficulties in pesticides application. With an inability to write and read, problems with the mixing of pesticides and calibration of sprayers for different pesticides cause concern about the real efficacy and effectiveness of pesticides application.

Through the eyes of MADC, commercialisation of small-scale cotton production is limited by small farm sizes that are not viable for sustainable commercial production. However, it appears that land expansion issues need to be preceded with avenues for increasing the productivity of land currently under production. When dealing with the land expansion issue, it is important to evaluate whether smallholders have access to land if they wish to increase area planted in cotton. Another important part of the land question is to better understand how easy it is for smallholders to gain access to additional land in the respective regions.

7.9 Concluding remarks

This section analysed the profitability of the small-scale cotton production in the two study zones in Mpumalanga. The study was conducted within the GM and BEA framework. Contrary to expectations, results of the study reveal a higher GM in Moutse compared to Nkomazi. This is despite the relatively higher costs of production experienced in Moutse. It is evident that producer profitability is a function of at least three things: the technology available (especially seed technology), the quality of seed cotton farmers produce and the services that farmers receive. in addition, to GM analysis BEA was applied to determine the level of sales that a hectare of cotton farm business must generate to break-even. Break-even quantity increases when seed cotton price declines. To break even, higher quantities of seed cotton are required in Moutse compared to Nkomazi at various level of prices.

The projected long-term decline in world price indicates the need for SA producers to focus on to achieve a reduction in the avoidable cost of production. This focuses attention on agricultural research, the extension system and coordinating the supply channel for credit, inputs and output in such a way that makes cotton profitable for both farmers and firms in the long run. Furthermore, high productivity is essential to survival when prices are low. It is very unlikely that a low-input, low yield approach to cotton production will allow the SA cotton industry to flourish. Profits earned from cotton production have the potential to improve the standard of living of small farmers. From a societal perspective, therefore, the government should have a strong incentive to see overall production and productivity increase. Thus, the provision of irrigation facilities is imperative in this regard. The growing of cotton under irrigation will provide farmers with a much improved yield per hectare, which in turn enhances profitability. It reduces the risk of unfavourable climatic conditions, thereby contributing to sustainability.

Finally, product prices have a large influence on the viability of small and emerging farmers including cotton farmers. It is vitally necessary for South Africa and other developing countries (e.g. Brazil, West Africa *etc*) to perseve with pressure to create a more level playing field in the world agricultural trade.