CHAPTER SIX: EVALUATION (EX POST) OF THE SHEILA PROJECT

6.1 Introduction

6.1.1 Background

As argued extensively in chapter three, the project approach in theory constitutes an ideal strategy for economic agricultural development. The mixed results achieved throughout the developing world and in South Africa with this approach, therefore warrants comprehensive analysis, to isolate constraints in implementation and inherent constraints in project design. As described in chapter four, a variety of project impacts are to be determined in this analysis, including institutional, financial, economical and social impact as direct impacts, an effectiveness analysis as well as indirect impacts such as linkages and spillovers. This will be done in recognition of the hypotheses of the study that economic diversity in a rural population must be dealt with, while integration between stakeholders through a project is required to mitigate the effects of high costs. The potential effect of project design criteria identified will also be evaluated. A thorough empirical investigation should isolate aspects that previously constrained the project approach.

6.1.2 Preparation and procedures

In this chapter the *ex post* assessment of the Sheila project from its inception in 1977 until its termination in 1994 and beyond is described. Project analysis also deals with policy analysis, as policy deals with how objectives are to be achieved through a strategy, from which a project originates (Gittinger, 1982; Van Rooyen, 1986). This analysis will therefore reflect to a large extent on the operational outcome of the policies of the Republic of Bophuthatswana (and through association South Africa) before democratisation in 1994. The projects in Ditsobotla were already subjected to impact assessment in the past, as it constituted a high profile agricultural development strategy. The interdisciplinary team of Bembridge *et. al.*, (1982) did a thorough analysis as did a DBSA team a few years later (Stilwell, 1985). Their work was analysed and will be reported extensively.

Various approaches and procedures were used. Quantitative analysis alone would result in an incomplete picture of what the project approach at Sheila entailed. As argued in chapter 4, quantitative data and its analysis can often result in a restricted view of the realities of rural life as it often fails to present the complexities of a specific livelihood (Chambers, 1991; Schönhuth & Kievelitz, 1994). Complementing qualitative methods are especially suited for gathering social and socio-economic information. Qualitative analysis therefore formed an important part of this study. A lack of quantitative data, especially for the last years of the project ('85-'94) when data was no longer captured by North West Co-operative, made qualitative analysis even more important.

Analysis started in 1997 with PLA-based inquiries in the Sheila area, with the objectives of building a relationship of trust and co-operation and developing insight. The co-operation of agricultural officials was sought and several PLA- based activities took place in order to get to know the area and its farmers. The reasons for the study were communicated and FSR-E-type demonstrations with crop-options were initiated. This PLA phase included preparation where literature and information was reviewed. This was followed by discussions with farmers on recent history as it relates to agriculture. During this exploration phase, trends, preferences etc., were determined to record the knowledge and activities of villagers. During the process errors in researcher-perceptions were revealed and a picture of what project livelihoods entailed gradually emerged. This contributed to a relationship with the farmers and an understanding of the people and the area. As described in the methodology chapter, these procedures circumvent a restricted vision of the realities of rural life and facilitate understanding. Communication was crucial and this methodology enabled farmers to become active collaborators in the analysis. This research methodology is valid for gathering social and socio-economic information; it focuses on attitude, eventually determining action.

The qualitative phase also enlightened the quantitative phase, as it facilitated the identification of the most important factors determining change. It facilitated the compilation of a quantitative questionnaire with focused questions. This could only commence once the area, its people and the agricultural problems were understood. Quantitative analysis was done through a survey to complement the information gathered through the literature and the qualitative process. A questionnaire was first tested with officials and farmers from the area, as well as with data analysts. A trained enumerator (which in 60 percent of cases was the analyst) asked the questions, and if not understood, explained them to the farmer. In this way the integrity of the data was enhanced. This process took several months. All the questionnaires were checked and prepared for analysis to again ensure integrity of the data. The questionnaire is included as Annexure Two.

The questionnaire used in this survey to quantify the farming system, was developed using as basis a questionnaire that was extensively used and tested previously. The ARC and the University of Pretoria used a similar typology-based questionnaire at various localities (D'Haese, 1997; Laurent, *et. al.*, 1999; D'Haese, *et. al.*, 1998; Van Rooyen, *et. al.*, 1998; Modiselle, 2001). In the first section information regarding land resources was requested in terms of the respondent's access to private, state, hired or tribal land. The size of and distance from this resource was also requested. As the qualitative phase revealed that sharecropping is very common, respondent's attitude towards rental contracts was asked. In section two household particulars were gathered. A description of the household, source of income, education of the farmer, expenses, transport and amenities was requested. Crop production data was gathered in section three. The farmer's skill-level was investigated through questions dealing with crop management aspects, inputs and output data was collected and labour requirements and constraints recorded. The same type of info was gathered for the animal enterprise, including type and herd size, reproduction and marketing data, as well as constraints. In the final sections data regarding on farm capital, support services and attitude with regard to the Sheila project was gathered.

Bembridge *et. al.* (1982), in the previous analysis of Sheila interviewed a total of 114 farmers, entailing a 20% sample size. This was perceived as considerably larger than other socio-economic studies at the time. According to a training manual compiled by the Universities of Pretoria and Ghent (Van Rooyen, *et. al., 2001),* a survey can be completed at the point where supplementary interviews result in the classification of that farm into an already existing farm type. This sampling process entailed a mixture of targeted and overall sampling, according to key persons' advice, and random route sampling (households added by chance). Although *"The larger the sample the better,* the balance between accuracy and practicalities (feasibility and manageability) was striven for. Whilst rural households differed according to a wide range of variables, typological techniques refer to a multi-variables analysis, rendering it complicated to determine accurately the sample size. Guidelines for human science studies suggest that for a population of ±1500, 20% of the population should be sampled. Beyond 5000, a population size is almost irrelevant and a sample size of 400 will be adequate. As for a satisfactory grouping phase, it is necessary to survey at least 80 to 100 households (Perret, 1999). The sample in this study interviewed 123 farmers in Sheila, Verdwaal and Springbokpan, entailing a larger than 20% sample size, sufficiently covering diversity.

6.1.3 The target population

The specific area investigated, are the villages of Sheila, Verdwaal and Springbokpan. Data from the national census of 1996 (www.statssa.org.za) describes the villages and the community profile: The population is exclusively African. Although the 1996 census statistics state that between 12 and 18% of households in Sheila and Verdwaal has access to electricity, this percentage has risen to around 75% since. Springbokpan is not yet electrified. Candles and paraffin lamps are the alternative source of lighting. Refuse disposal is through the use of a communal or own refuse dump. No formal service is available. The following tables further describe the dynamics and profiles of the villages concerned.

Table 6.1.1: Dwellings and water source of three Ditsobotla villages (www.statssa.org.za)

	Sheila	**Springbokpan**	**Verdwaal**
House on separate stand	217	361	106
Flat/room on shared stand	20	12	49
Informal dwelling	26	20	243
Total	263	393	398
Piped water in dwelling	47	0	12
Piped water on site	735	12	1
Public tap	577	0	1771
Tanker/borehole/well	31	2015	96
Total	1390	2027	1880

Housing in the area consists mostly of brick houses with corrugated iron roofs. Most households have a house on a separate stand, except for Verdwaal where a significant number of households live in informal dwellings, made predominantly of corrugated iron. Although only 3.4% of households in Sheila and 0.6% in Verdwaal have access to piped water in the house, water supply for the three villages is above average for the district, with Sheila and Verdwaal having access to either water on

site, or a public tap nearby. In Springbokpan, the water supply consists mainly of boreholes. A standard determined by the Department of Water Affairs and Forestry is standpipes at 200 metre radii. This is adhered to in the study area. In the Ditsobotla district, ±70% of people do not comply with this standard. However, Sheila, Verdwaal and Springbokpan do not fall on the priority list and are above average for the district. Regarding electricity, in Verdwaal 23.5% of households use a prepaid system while a mixture of prepaid and conventional electricity services are provided to 12.2% of households. Springbokpan is not yet electrified. Only 0.3% of households in Ditsobotla have sanitation in the form of septic tanks.

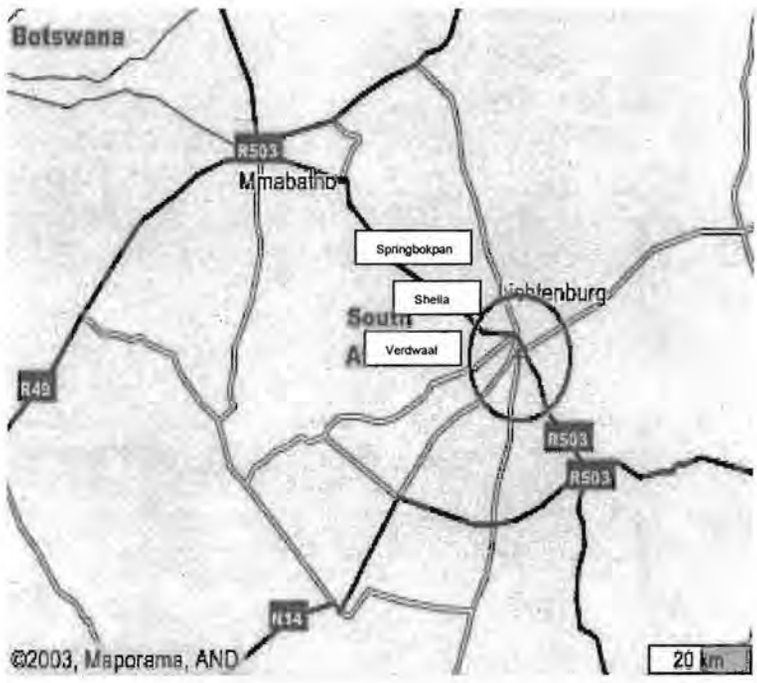


Figure 6.1.1: A map illustrating the location of Springbokpan, Sheila and Verdwaal, in relation to two major towns (Mmabatho and Lichtenburg) in the North West province. (See also Figure 5.2.1)

Table 6.1.2: Age distribution and education level in three Ditsobotla villages (www.statssa.org.za)

	Sheila	Springbokpan	Verdwaal
00 – 04 yr.	170	230	278
05 – 19 yr.	515	795	638
20 – 44 yr.	471	573	687
45 – 69 yr.	185	319	217
70 and above	36	68	47
Unspecified	13	42	13
Total	1390	2027	1880
No schooling	308	353	555
Grade 1 to 3	143	229	242
Grade 4 to 7	393	565	475
Grade 8 to 11	297	533	277
Matric only	52	75	33
Post Matric	2	8	1
Unspecified	25	35	19
NA: Aged <5	170	229	278
Total	1390	2027	1880

Table 6.1.3: Employment, occupation and individual annual household income of three villages in Ditsobotla (www.statssa.org.za)

Employment:	Sheila	Springbokpan	Verdwaal
Employed	103	151	145
Unemployed	351	523	473
Housewife/home-maker	53	95	350
Scholar/full-time student	186	286	103
Pensioner/Disabled	100	185	170
None of the above	60	75	36
NA: Aged <15	537	712	603
Total	1390	2027	1880
Occupation	Sheila	Springbokpan	Verdwaal
Official/manager/professional	8	16	4
Technician/Clerk/Services/Sales	20	35	29
Skilled agricultural workers	2	4	19
Crafts & trades workers	13	21	49
Plant/machine operators	20	20	32
Elementary occupations	33	40	111
Occupation unspecified	1294	1891	1636
Total	1390	2027	1880
Individual annual income	Sheila	Springbokpan	Verdwaal
None	1194	1579	1546
R1-2400	6	311	48
R2401-6000	74	71	142
R6001-18000	88	44	125
R18001-42000	20	18	18
>R42001	8	4	1
Total	1390	2027	1880

Obvious from table 6.1.2 is that the population is predominantly young, with almost half of the population younger than 20. More than half the population of the villages have none or a limited, primary school education. According to the data in table 6.1.3, only 9.6% of the total population of

these three villages has official employment. During the 1996 census, 84% of the population of Sheila, Verdwaal and Springbokpan reported no income. Nine percent reported income under R6000 p.a. and 7% an income of higher than R6000 p.a.

Income levels are generally low. However, judging from the general state of these villages, the number of remittances as well as the agricultural economic data indicated in the survey that will be discussed later, this is obviously an incomplete picture. As 26% are unemployed, this illustrates the relatively high number of the very young, students, pensioners and those informally occupied. Pensioners, of whom there are a significant number, get a regular income from the state (roughly R700 per month in 2003) and for many households this is the only regular and predictable source of income. It is however obvious that unemployment is a serious problem.

Regarding gender, 47 to 48 percent of the population of all three villages is male, with the rest female. The extent of unemployment is clearly illustrated by the table above. There are very few skilled workers in the villages and especially the low number of skilled agricultural workers is significant.

6.2 Direct project impact

6.2.1 Institutional impact

6.2.1.1 Strategy:

When the Department of Agriculture of Bophuthatswana was established in 1976, the official view was that large-scale, modern projects were a short-term solution to facilitating food self-sufficiency. The development strategy of the Department of Agriculture at the time was based upon a dual approach. This firstly comprised large-scale, capital intensive and profit oriented agricultural production, seen as a short to medium term measure run almost exclusively by capital and expertise brought from outside the project area. Secondly, it focused on relatively small-scale, labour intensive farming, based on the traditional communal system and community development. In contrast, Agricor and the CED subsequently viewed the Ditsobotla scheme as a long-term development vehicle, including social development. Agricor's strategy was to initially concentrate on production, supposedly followed by development of human potential, i.e. integrated rural development.

When the Sheila project commenced in 1976/77 on roughly 3500 ha of state land, shared by 196 landowners, the original view of a short-term goal was clearly evident as illustrated by the fact that the land was actually worked by only 31 mechanisation contractors. Of these contractors, 80% employed their own tractor drivers. A substantial Human Capacity Development programme did not in practice complement Agricor's focus on production. Despite project objectives such as development of natural and human resources and self-sustaining communities, target farm-income soon became the sole objective, leading to increased management control. This was partly the result of the original project objectives being broad, with the priority being maize production. The other key objective, namely establishing independent farmers, was difficult to achieve, seen in the light of the strategy and political pressure to produce maize. When evaluated with the design criteria established in chapter two, the strategy was only partially sound, as only co-ordination, linkages, cost saving and value adding were attempted to an extent. Participation and Human Capacity Development were striven for in theory, although this did not always feature in practice. The diversity in the community, sustainability and the social realities were also not recognised at the time as important planning parameters. A philosophical argument on what is supposed to come first - development or participation (Cohen & Uphoff, 1975) is also relevant. It was established by Bembridge *et. al.* (1982), that prior participation in future project establishment phases would greatly enhance production and development. It is argued that certain conditions must be met before development can be successful at grass-roots level. This includes meaningful, productive participation. This was not sufficiently addressed at Sheila.

6.2.1.2 Organisation:

The project was built on a modification of the Israeli Moshav system; centred on a production co-operative electing its own management committee, with agricultural production through a contractor

system (Bembridge *et. al.*, 1982). This approach of co-operative management and central provision of services to individual holdings effectively combined state, private and co-operative capital in financing and management of a contract farming system. In terms of the developed design criteria, the criteria of optimal linkages were fulfilled. Initially NWC assisted departmental extension with management and financing. Agricor, when established in 1978, commissioned the NWC to continue as managerial agents, until 1985, when management was relegated to Agricor (Francis, 1999).

When the weaknesses of the project became apparent, particularly with regard to limited participation and low production levels, a proposal for estate type farming by Agricor on behalf of farmers, to optimise yields and recover debt, was considered. This illustrates the considerable political pressure to 'show successes'. Alternatively the DBSA proposed more farmer decision-making, less intensive (and costly) production methods, larger individual land holdings and lower yield targets to lower risk, enhanced viability and increased participation. The rationale of the DBSA was that the high target yields aimed for caused high input costs, higher risk and lower net farm incomes. Ironically the primary co-operative remained successful throughout, as a result of the continuous turnover in inputs provided to farmers. In contradiction, interest on loans seriously limited the profitability of farmer enterprises, especially in drier seasons. As it became obvious that the contractor system was not viable, more of the responsibilities were taken over by officials and eventually the primary co-operative rendered basically all services.

During 1991/92 a comprehensive re-planning phase took place to enhance independence and promote farmer involvement and economically viable resource utilisation. For this purpose the so-called leader farmer system was implemented. Major restructuring of technical and institutional strategies was complemented with major debt write-off. Committee members were hence paid a salary, as were security guards, appointed from the local community to safeguard crops. To qualify a farmer had to work 75 ha, obtainable through sharecropping agreements. To enhance participation, all the debt of the leader farmer and his consolidated land was written off over 10 years, provided that the landowners stayed in the re-planned programme. No interest was to be raised. The re-planning aimed to shift the responsibility for production to the landowners and to encourage economic utilisation and viability through sharecropping. Mechanisation equipment still belonged to the co-operative but the leader farmers could apply for loans and buy this equipment at 'near-market related' values. Written contracts between the leader farmers, the landowners and Agribank were required and were drawn up by the project management. Agribank was the credit parastatal closely linked to Agricor and most often worked with Agricor in Bophuthatswana's development projects. Rental was determined by the participants and could be in either cash or bags of maize. The harvest was security for a production loan and the equipment was the collateral for the mechanisation loan. When an application was viewed as a 'high-risk' proposition, the Agricultural Department guaranteed these loans. In its turn, Agribank provided conditions for loans, processed applications and provided statements guaranteeing debt write-off. Those unwilling to partake could remain in the project, where Agricor continued to produce on behalf of landowners. Agricor and the co-operative facilitated implementation of the new scheme by explaining it, identifying leader farmers and grouping these with their lessees. Agricor also assisted with mechanisation, loan arrangements, maintained the records and monitored programmes and debt schedules. The Department of Agriculture made budgetary provisions and

provided Agribank with guarantees securing loans. This dual system persisted until early 1994 when Agribank liquidated the co-operative. While the general reason for this was apparently the uneconomic running of the co-operative and project, the specific reasons were not explained. During the political upheaval that took place during March and April of 1994 most assets and records of the primary co-operative disappeared and it was permanently closed.

The design criteria that were obviously not dealt with in the organisation of the project, include participation, co-ordination and diversity. The 'political impact' that demanded high production, detrimentally influenced these aspects. Technical changes also failed to account for social realities, while no research activities were structured. It was also not recognised that for most of the population, agriculture was one of various livelihood strategies, resulting in limited commitment to the project.

6.2.1.3 Support services

As indicated by the strategy, comprehensive support was available. Initially NWC seconded various managers (general, workshop, financial and field managers) to provide technical, administrative and financial assistance and infrastructure. Later two departmental Tswana section managers employed by Agricor were posted to the project with duties to advise and liaise with farmers. Agricor later commissioned NWC to continue as managerial agents for the project until 1985, after which Agricor was solely responsible for project management (Bembridge *et. al.*, 1982).

6.2.1.3.1 Extension, training and access to information:

Although there was an initial emphasis on training specifically, this was, according to previous analyses, mostly sporadic and insufficient. *Ad hoc* training with little recognition of the participants' level of education was delivered at random. No Human Capacity Development programme was evident, resulting in limited participation. In general, technical knowledge was found to be poor during evaluations (Bembridge *et. al.*, 1982; Stilwell, 1985). Research and demonstration activities were scarce. According to the DBSA report (Stilwell, 1985), there was a training programme for committee members, dealing with the role and function of the committees. Participating farmers also received sporadic training in various aspects of cultivation.

During the 1991/92 replanning, extensionists worked with project committees in an extensive training program. Tractor drivers received several 'refresher' courses, including literacy courses and extensive training in crop production. However, farmers when specifically asked during analysis, generally did not view training as an important advantage of the project. Despite this, a lack of HCD was recognised as a major constraint during evaluations, as managerial aptitude is the most important ingredient in farming efficiency (Bembridge *et. al.*, 1982; Stilwell, 1985). At some stage the Lichtenburg Agricultural Union established an advice committee to support Sheila farmers. This concept apparently never progressed further than the original idea as no record could be found of any such activities.

6.2.1.3.2 Input supply and mechanisation services

Initially NWC provided services from its Lichtenburg office, but a primary co-operative for the Sheila ward, was officially established in 1981/'82 with 400 'farmers' or landowners, of which 19 were actual contractors. Since its inception, membership of the co-operative, that also provided a retail service, was open to all farmers in the area. Production inputs, tractors, parts etc., were supplied on credit through the NWC, and then channelled through the primary co-operative. Contractors also received loans for tractors, equipment and fuel. During 1985 loans to the value of R6.6 million were granted and the co-operative had cash to the value of R5 million. Although the mechanisation equipment officially belonged to the co-operative, it was given on loan to the selected contractors.

The co-operative approach was extensively used in Bophuthatswana as part of the provision of decentralised services. Co-operatives later developed into local organisations that co-ordinated the organised farming community and offered support. By the early 1990s serious problems were evident at most co-operatives. Some of the conclusions drawn in internal memos were that local management and initiative, vital for success, were mostly missing. Generally financial statements were 2 to 3 years in arrears and sound financial management was the exception and not the rule. Co-operatives were often seen as subsidised retail shops and often did not carry agricultural supplies. Only 10% of all transactions could be directly associated with Agriculture. A lack of demand for agricultural supplies was eventually evident, resultant from a lack of commercial agricultural activity. Design criteria obviously lacking in service provision were proper co-ordination, linkages and participation. With more effective linkages, substantial cost saving could have been achieved. Again technological consideration did not match social realities.

6.2.1.4 Project management procedures:

6.2.1.4.1 Participation:

Participant selection was to a large extent determined or at least influenced by the traditional authorities. Farming ability and potential did not play a significant role in this process, although most contractors had some mechanisation experience. Selected contractors and a substantial number of officials eventually did most of the actual farming, with up to 70% of the land right holders being migrants, working elsewhere. Although there were early attempts to involve farmers in decision-making, by the mid-1980s farmer involvement was extremely limited and centralised management was running the operation almost totally. As the political pressure to perform increased, the need to produce lessened management's enthusiasm to train. Whilst production was dealt with by management, farmers in general were not motivated to extend themselves. Effectively, from the inception of the projects, the majority of the previously active land right-holders ceased to farm, while those that continued, were subject to intrusive and often authoritarian management practices. This contributed to the farmers becoming suspicious of state institutions and reluctant to commit resources to development projects (Francis, 1998). Only 6-10% of landowners were involved in the project at any stage, and then mostly as employees, i.e. drivers, mechanics, foremen, secretaries or watchmen.

Key informants and previous analyses concluded that landowners (who in fact only had access to state allotted land) were to a large extent not involved in the agricultural activities. The rigid income targets determined by Agricor contributed to central control and less farmer involvement. The importance of participation is illustrated by the significant correlation between yield and participation as determined by Bembridge *et. al.*, (1982). It was clear that the few farmers, who took an active part in the project, were significantly more successful. In general however, a limited emphasis on training and HCD was evident and little participation took place.

6.2.1.4.2 Tenure and land allocation:

All participants were allocated 15 hectares arable state land and contractors 30 ha each. The size of holdings was not determined by any feasibility analysis. The land available for the project was simply divided by the number of potential participants. Contractors were allocated an average of 130 ha to work, including their own lands. However, lands at Sheila were most often cultivated as a unit with cost division and profits calculated in the office. By 1985 roughly 80% of the farmers involved favoured (and practised) sharecropping. This meant that an innovative farmer utilised his allocated land and those of other landowners, and provided the 'land owner' with a share of the yield.

Agricor proposed project adaptations during the early eighties, including a demonstration farm, stricter farmer selection and larger (45ha) units. Also on the agenda was intensive community development and training. However, consolidating farm units was fraught with problems and these proposals were never realised. The socialistic nature of the project with agriculture practised on behalf of farmers, gave rise to unrealistic expectations. Although many suggestions were made when farmers were asked during 1985 how the system could be improved, 80% indicated that they favoured the prevailing system where Agricor farmed on 'their' land for a share of the yield. In contradiction, many suggestions centred on participation and communication, including clearly marked plots, quicker credit, less input use, etc. (Stilwell, 1985).

The project scale was a key variable and economies of scale played an extensive role in the project. Costs saving aspects of economies of scale were not recognised. Roodt (1983) described an interesting perspective on the farm model and the land issue: during the early 1980s, Sheila occupied state land comprising 6500 ha and accommodating 429 farmers. Given a realistic 10-year climatic cycle developed in consultation with experienced farmers in the area, a series of probabilities were designed (Roodt, 1983). A climatic cycle representing one complete crop failure, four 'low to average' production years, three 'good' and two 'excellent' years was put forward as a realistic model. This is represented by maize production figures of zero, 0.5 to 1.5t/ha, 2-3 t/ha and 3.5-4t/ha respectively. This coincides with average yield data for the area. A gross average income based on a 1983 price of R135/ton leads to a gross average income of R4961 (for 15 ha) and a net earning of R730 (Roodt, 1983). At the time a per annum income of R5000 was the amount identified for a livelihood from agriculture. Although roughly 80% of the Bophuthatswana population of 1.01 million did not earn this, a Sheila farmer would require almost 103 ha to obtain such a livelihood. Not only is 15 ha totally insufficient, but it is also likely to cause increased debt (Roodt, 1983). Effectively 100ha units mean

that approximately 2000 crop-farming families could be accommodated in Ditsobotla. Given a capacity for the district of 27 000 livestock units, another 100 cattle farming families should be able to make a living from agriculture. A total of 2100 farmer households can therefore conceivably find a rural livelihood, leaving 14 000 rural households that will have to find income elsewhere (Roodt, 1983). Stilwell (1985), indicating that agriculture could only accommodate 15% of the households of Ditsobotla, confirms this finding. Highlighting the limitations for small-scale agriculture is that Ditsobotla has high potential arable land and was seen as the breadbasket of Bophuthatswana (Roodt, 1983). This again illustrates the disparity between social reality, political aspirations and technology options. A redesigned project approach, dealing particularly with transaction costs and providing for a participative planning process for different types in a typology, could address this serious issue.

6.2.1.4.3 Responsibilities of management and the farmers' committee:

A committee or Board of Directors (representing the seven participating villages) was responsible for liaison and 'decision-making'. This committee of seven members (one per village) was elected annually and although some were re-elected, changes were common. Committee members were paid a salary. Although committee members were generally not very well educated, they had status in their particular villages. The committee received training regarding the functioning of an effective committee and members were also exposed to commercial agriculture. In general stakeholders interviewed recently, perceived inputs from the committee into project management as very limited. The perception of many locals was that project management largely manipulated the committee. Ironically when individuals from the villages questioned decisions and actions of project management, committee members sided with management and did not support these concerns. Participants also had a preference with regard to the manager of the project. While most participants were largely satisfied with one long-time manager, his replacement was unpopular and allegations of mismanagement and corruption were made. The DBSA study (Stilwell, 1985), established that despite objectives such as natural and human resource development and self sustaining communities, income targets lead to more management control. Also resulting were more absentee farmers and limited contribution and participation of the committees.

In theory, management 'arranged' ploughing but all other cultivation was the contractor's responsibility. In practice, substantial support and guidance was provided during all cultivation and maintenance practices. Implements and tractors provided through management were used freely outside the project but maintenance was the responsibility of project management. A blanket package of inputs was generally applied and in general individual management practices caused most yield variation. With the exception of weed control, all cultivation and maintenance practices were effectively performed by the contractor and supervised by the project management. The majority of participants abstained from maintenance practices. Although in theory the design criteria of co-ordination, linkages and participation were recognised, in practice political pressure determined the direction of the project.

6.2.1.4.4 Linkages:

During key interviews, former project employees and managers named insufficient linkage and communication between stakeholders as a major constraint. Contractors did communicate with extension and management, while most other participants were generally uninformed. The ARDRI team (Bembridge *et. al.*, 1982) established that almost half (47%) the participants were unaware of Agricor's existence during the early 1980s, indicating the lack of linkage and communication. At this time Agricor's image was poor with 60% of respondents. Ordinary participants had contact with extension officers less than once in two years. Almost two thirds (65%) of participants complained of limited consultation. For many participants their contact with management entailed the collection of a cheque and a financial statement once a year from the project offices. Often these statements reflected raised input costs, not discussed even with the more active participants, mostly contractors. These statements only indicated a net cash value of the harvest, without any breakdown. Roughly 60% of contractors did not understand these financial statements and most had little technical understanding. The DBSA evaluation found that further criticism related mainly to late payments and mistrust in the production figures given by management (Stilwell, 1985). However, only a few farmers were aware of their precise yield in either bags or tons per hectare. The majority described loads (wagonloads) with an unknown capacity without consideration of transport cost. Linkages, communication and record keeping was sub optimal and access to specialists (who in theory were available), demonstrations and the primary co-operative was generally poor. Liaison with the committee was also not optimal.

6.2.1.5 Enabling environment:

Various infrastructural adaptations of the physical environment took place to facilitate project implementation. A tar road linking the main Mafikeng-Lichtenburg route to the primary cooperative at Sheila, management offices and the villages of Sheila, Verdwaal and Springbokpan to Itsoseng and other villages in a westerly direction originate from project initiation. Comprehensive infrastructure in terms of buildings was erected. Other access roads to lands and extension offices were maintained. Eventually each village had an extension officer and an administrative office from which activities were coordinated. The main complex at Sheila consisted of various offices, a primary cooperative with a fuel depot and various buildings with supplies. Extensive training facilities were also erected together with living quarters for the various employees. The layout of the lands as well as fencing of these lands was also done. Extensive mechanical and other equipment was also made available.

6.2.2 Implementation effectiveness analysis: an ex *post* LFA of the Sheila project

As described in chapter four, LFA is a planning tool providing a structured format for specifying the components of an intervention, and the logical linkages between a set of means and a set of ends. It serves as a tool for defining inputs, timetables, assumptions for success, outputs and measurable indicators for monitoring and evaluating performance.

Using the before-project scenario as described by Seobi (1980), Redelinghuys (1981) and Bembridge *et. al.* (1982), constraints as experienced by the agricultural community at Sheila are described in a 'problem tree' as the first part of the LFA-process.

In summary, during the late 1970s, land holdings were generally smaller than 5ha and less than two thirds of all land right holders cultivated, due to a lack of capital, limited credit facilities and debt. Sharecropping was extensively used and access to services was a major limitation. Yields of 500 kg/ha were achieved on average. Less than half the farmers bought inputs and then at very low rates. Most farmers lived below the poverty line. Technology adoption rates were low and farming units small to the extent that they were not viable. This scenario is graphically illustrated in the 'problem tree' in figure 6.2.1:

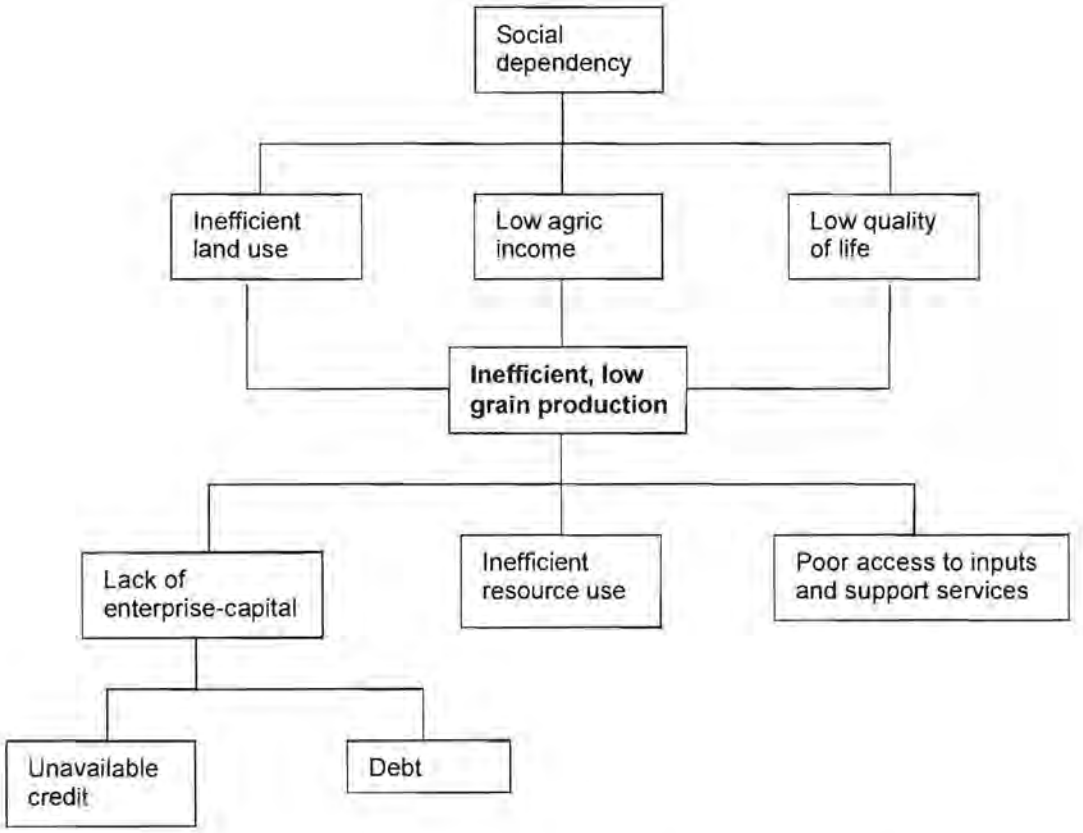


Figure 6.2.1: A 'problem tree' illustrating constraints in agriculture at Shiela before project initiation.

As the subsequent phase of the LFA, an objectives analysis is carried out; formulating the negative states in the problem tree, into positive states achieved in the future. This is illustrated in figure 6.2.2:

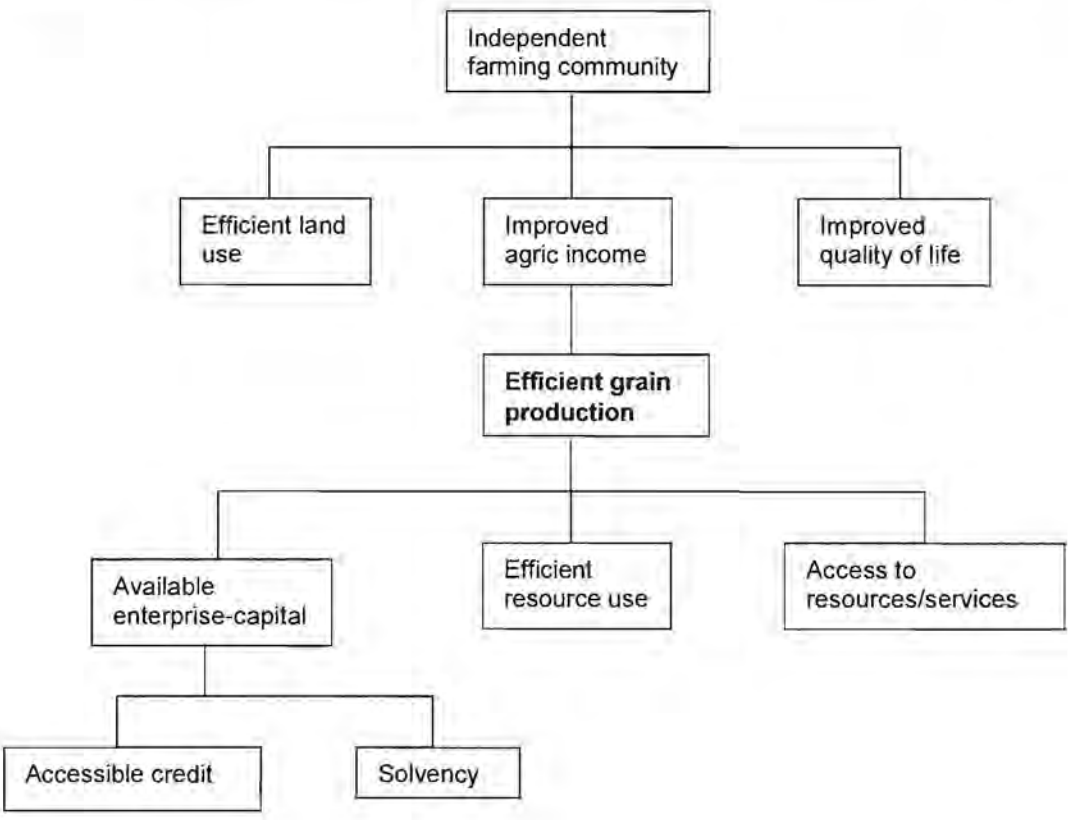


Figure 6.2.2: An 'objective tree' illustrating possible solutions for agriculture at the Shiela project.

How to achieve the objectives graphically illustrated in figure 6.2.2 is dealt with in the next step of the LFA, called a strategy analysis, in which specific 'intervention strategies are identified. This is evaluated at the Shiela project, which entailed an elaborate intervention.

The project's main aim was to increase grain and specifically maize production by integration of farmers and stakeholders (NWC, Agricor, and Farmers' committee) into a capital-intensive cropping enterprise. It was initiated during the late 1970s on roughly 4000 hectares. The objectives held in improved utilisation of high potential land for maize production, selection and training of contractors, increased efficiency and the formation of primary co-operatives. The long-term goal was to develop agricultural potential and improve living standards. A comparison of goals with potential achievements describes the rationale beyond the Sheila project. Implementation effectiveness was therefore determined through the final phase of the logical framework analysis, i.e. the matrix illustrated in table 6.2.1. It indicates why and how the project was carried out, where the data required was to be obtained and which assumptions were made. It places the project in the larger framework of constraints and goals as well as the development context.

Table 6.2.1: Logical framework: Comparing goals & achievements of Sheila project: 1977-1994

	INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS (OVI)	VERIFICATION SOURCES	ASSUMPTIONS (External factors)
Goal	Improved agric production & quality of life	Household income, health, housing employment.	Annual Agricor reports, ARDRI report, CSS statistics, publications	
Purpose	Efficient grain production	Yield statistics, input quantities, crop income	Production records (NWC), Agricor reports	Sustained commitment, profit and HCD
Intermediate result	Increased self-sufficiency	Farmer no's, records, yields, farmer profile	NWC production records, Agricor reports, publications	Normal climatic cycles and positive input/output price relation
Intermediate result	Efficient, sustainable land utilisation	B-C ratios, lands planted, cultivation practices, yields	CBA, survey, production records (NWC), reports, expert interviews	Commitment & capacity of selected participants
Intermediate result	Increased profit	B-C ratios, Net farm profit, profit margin.	CBA, surveys, Agricor reports	Skills & technology sustainably transferred
Activity 1	Organised service provision through NWC management + EOs	Participation, maintenance & yield records, net project profit	Minutes & attendance figures, key informant interviews, ADRI & DBSA reports & publications	Skilled & committed stakeholders & effective co-operation
Activity 2	Enhanced participation & linkages through farmer' committees & HCD	Meeting minutes, issues raised, status, activities, farmer #'s	Membership no's, minutes, attendance, key interviews, ADRI & DBSA reports & publications	Functional & accepted committee, sound communication & training
Activity 3	Input, equipment, credit, & services provision	Inputs & equipment handled, loans granted & services rendered	Progress reports, minutes, NWC financial records, key interviews	Effective and efficient delivery of services & resources
		Inputs/Resources: Capital, infrastructure, personnel, tribal authorities, and farmers.		Prior conditions: Participant and stakeholders interest in model, funding available

The Objectively Verifiable Indicators (OVI) in terms of the goal focuses on household income, health status, housing and employment, which did initially improve as a result of the project. Regarding the purpose - input utilisation increased as did maize yields and subsequent crop income. However, although the number of farmers did increase in theory, in practice, project management acted on behalf of the beneficiaries. Regarding the intermediate results, self-sufficiency was not achieved. A farmer profile was established in the analysis done by Bembridge *et. al.* (1982), and to a lesser extent by Stilwell (1985), but project management was never adapted as a result of this. Other OVI dealing with participation and linkages would include records of meetings, linkages, training activities, active farmer numbers, etc. This aspect did not receive enough attention and records of such activities were scarce. In terms of linkages, records of extensive input transactions, loans granted, equipment usage and services rendered were recorded, but this was mostly handled by project management. A critical comparison with the project design criteria illustrates that the OVI did not sufficiently reconcile technical aspects with social realities: the early stage of development was not accounted for and most beneficiaries were unable to adapt the technology and management procedures used in the project. Diversity within the community was also not recognised or dealt with. Although linkages and co-ordination was facilitated and structured, this was not optimally utilised to enhance communication and empowerment. With regard to skills development, participation and social and economic sustainability, limited attention in the OVI and records of related activities are found.

Production improved under project management, especially during the first decade of the project. Surplus production led to significant increases in agricultural income and standard of living. However, very little empowerment rendering of farmers took place (Bembridge et. al., 1982). Although the top farmers did well and non-participants were also positively influenced through spin-offs, the majority lagged behind, due to a lack of commitment and training. While input providers and specifically the North West Co-operative benefited significantly in terms of increased trade, equitable distribution of benefits was not achieved. In spite of the apparent lack in real training, a number of farmers did learn various skills and cultivation practises during the years of the project. The majority of farmers indicated satisfaction with the project.

In financial and economic terms, the first five years of the project were successful as illustrated by benefit cost ratios of roughly 1.35 (Bembridge et. al., 1982). Average profits were impressive. However, individual participants achieved large variation in yield and profit. Although average net farm profit increased significantly over the first few years as skills and input usage increased, only the top third compared commercially, while the rest compared poorly with non-agricultural income groups. This is a clear indication that the hypothesis of recognition and dealing with diversity is accurate. Liaison and participation was poor (Stilwell, 1985). According to key informants, political pressure originating from Mmabatho was intense. Although the basic project concept was sound, paternalism, poor communication and lack of empowerment inhibited development. Bophuthatswana never resolved the conflict between its commitment to maximise output and its supposed wish to establish a spectrum of farmers. According to key informants, the project was partially successful, but poor selection of participants, the tenure system, lack of participation and decision-making inhibited performance and sustainability (Strauss, personal communication; Francis, 1999).

The high target yields aimed for caused high input costs and higher risk. The project eventually left many participants in debt and compromised people's access to land. Attempts to find alternative income for those displaced, through dairy, poultry and rabbit projects were largely ineffectual (Francis, 1999). According to the ARDRI report, pareto optimality, the difficult to achieve the point on a social welfare function where improvement in the welfare of one group does not lead to diminishing welfare of another (Van Rooyen, 1983), was not achieved. The main aim, to develop arable potential and self-sufficiency was achieved temporarily, for a limited number of participants and at extensive public cost.

In terms of the project design criteria, technological aspects of the project did not account for the social development stage of the community, economic diversity between farmers was not recognised, linkages were not effective in dealing with these problems and there was limited emphasis on participation and empowerment. Poor participant selection influenced by political favouritism, political pressure leading to excessive management control and extensive subsidisation eventually caused the downfall of the project. Especially the lack of empowerment eventually made the initially impressive project non-sustainable. The approach was unable to establish a range of farmers and instead left many in debt, compromised land access and enhanced class differences. The project was discontinued in 1994 as Agribank forced closure of the co-operative due to financial difficulties.

6.2.3 Social impact

This type of impact can also be described as people-level impact. It includes the direct impacts on the people 'on the ground', i.e. project participants, non-participants and the community at large. Primary data pertaining to socio-economic profile, agricultural production and marketing was collected by means of various qualitative and quantitative approaches. A reconnaissance survey and meetings with farmers, officials and other role-players, as well as interviews with key informants formed part of the qualitative phase. An elaborate participatory appraisal process of three years illuminated local dynamics. A quantitative survey could consequently be attempted with confidence and a structured questionnaire took place during 1999-2000, in order to define distinctive farmer groups or types. This finally led to the construction of a typology and its refinement from all gathered data and the participative LFA analysis.

6.2.3.1 Statistical analysis to describe diversity and determine a typology

With the quantitative survey, data regarding a total of 128 variables was recorded, from interviews with 123 respondents. Although this sample comprises roughly 60% of all the agriculturally active people in Sheila and Verdwaal, as well as roughly half those from Springbokpan, given the large number of variables and the inherent variation in the diverse community, statistical analysis was required. Three programmes were used for the statistical analysis of these data: SAS, Statistica and SPSS (Statistical Package for Social Science).

An initial descriptive statistical analysis was carried out to determine frequencies for categorical data and means for the metric data. Also determined was the standard deviation, as indication of variation. A main impression was that variation was relatively high with coefficients of variation between 40 and 100 and even higher for some variables. These results were used in the descriptive phase, elaborated upon extensively in the socio-economic evaluation (6.2.3.2).

For the next level analysis, a number of variables perceived as determining farmer type were pragmatically isolated from the initial 128, for the period 1997/98 and 1998/99. These variables quantified the household, resource available to the household and agricultural performance. They included land available for cropping; land planted and sharecropped during these seasons; mechanisation hired; education of the household head, household spending on food, transport, electricity, savings, loans and leisure; household size; numbers of income entering the household; inputs in terms of kilograms of fertiliser and seed bought; resulting yields for maize and sunflower; livestock income; investment in feed and medicine; mechanisation available and livestock numbers.

Data for certain variables were also combined into new variables to increase clarity, reduce variation and facilitate analysis. The amounts recorded for the seven variables dealing with spending were added to obtain one amount called 'household spending'. This figure on its own has limited meaning, but is ideal for the purpose of comparison in the typological analysis. Regarding the livestock enterprise, 39 variables described herd composition, mortality and reproduction were recorded and are

dealt with in the socio-economic evaluation (6.2.3.2). For the purposes of determining a typology however, only one new variable was used; the sum of all types of livestock. Another compilation is the calculated average hectares planted for the years analysed, while all inputs (seed and fertiliser) were simply added up to derive the combined variable: 'input-kilograms'. This figure again has no direct meaning, but is useful for the typological analysis. For the same purpose the average yields for sunflower and maize were determined and then added into one variable. Furthermore, due to the high variation in and non-normality of the data, land size, input and yield variables had to be transformed (log transformation) to facilitate sound analysis. .

The next logical step was a multivariate analysis. Factor analysis was used as a dimension-reducing technique to identify the variables that had the largest impact (eigenvalues) on variance, and largest physical meaning. Variables, representing socio-economic aspects (education, household size, incomes, spending) resource access (land available and planted, inputs and mechanisation), and performance (yields, stock number) to be used as indicators, were isolated.

A PCA (principal component analysis) was subsequently done on these variables to group farmers according to the first two principal components. These components can be viewed as independent, weighted average values for the variables, thus facilitating the determination of different types of the proposed typology. Figure 6.2.11 in the following section provides a graphical representation of the first two principal components (PCs). The first two PCs explained roughly half the total variation in the variables. The third PC did not contribute meaningfully to the explanation of the resulting groups and no further PCs were done. From the first two PC scores and the position of farmers (cases) in figure 6.2.11, four typological groups were identified pragmatically, by comparing farmer averages for the indicator variables, with their position on the graph. This process was informed by the long term engagement with the community, spatial distribution on the graph and the mentioned quantitative values per farmer. These groups were then tested, as indicated in figure 6.2.3; a box and whisker plot on Principal Component 1. It indicates median values of –1.33 for group 1; -0.41 for group 2; 0.62 for group 3 and 1.88 for group 4, respectively. It also indicates that the groups satisfy the demand for normality. This figure represents a preliminary identification of groups, before verification:

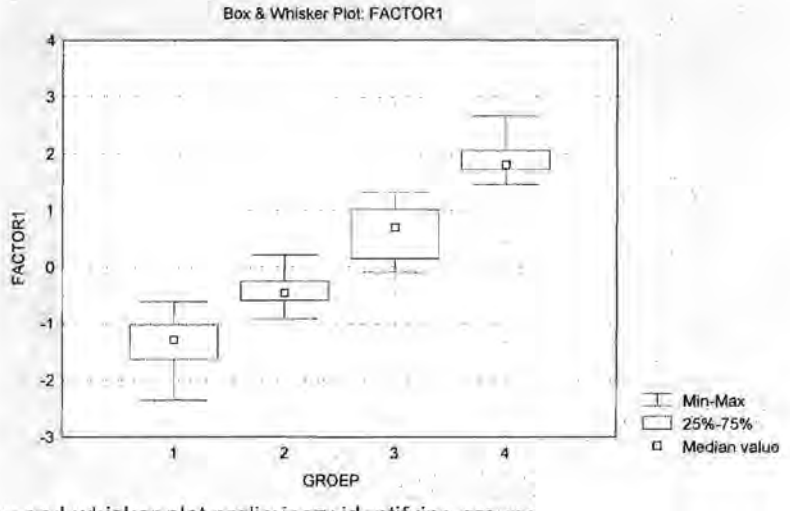


Figure 6.2.3: A box and whisker plot preliminary identifying groups

The next step was a discriminant analysis, used firstly to test the ability of the variables used as indicators to explain the differences between groups. Secondly, it was used to determine the validity of the grouping. A classification function for each group was also developed, in order to facilitate the description of a model for typology formulation.

Table 6.2.2: A stepwise discriminant analysis, to identify the most significant variables.

Step	Entered	Partial R-square	F value	F probability
1	Ha-used	0.811	161.22	<.0001
2	Tractors	0.376	22.49	<.0001
3	Yield sum	0.256	12.75	<.0001
4	Land size	0.250	12.23	<.0001
5	Hiredmec.	0.159	6.85	0.0003
6	Input kg	0.093	3.70	0.014
7	Income #	0.068	2.62	0.055
8	Education	0.102	4.02	0.009

Classification function:

Group 1: $y_1 =$ -48.8 + 10.55log(Ha-used) + 6.43(tractors) – 7.7log(yieldsum) + 17.84log(landsize) + 16.22(hiredmec: 1 if yes, 2 if no) – 0.15log(inputkg) + 6.45(income) + 5.19(education)

Group 2: $y_2 =$ -56.6 + 25.94log(Ha-used) + 6.64(tractors) – 0.03log(yieldsum) + 11.66log(landsize) + 15.84(hiredmec:1 if yes, 2 if no) + 1.21log(inputkg) + 6.97(income) + 4.93(education)

Group 3: $y_3 =$ -70.94 + 27.57log(Ha-used) + 8.22(tractors) + 9.72log(yieldsum) + 18.04log(landsize) + 12.21(hiredmec: 1 if yes, 2 if no) + 1.54log(inputkg) + 8.20(income) + 5.76(education)

Group 4: $y_4 =$ -111.58 + 31.88log(Ha-used) + 10.52(tractors) + 18.57log(yieldsum) + 27.01log(landsize) + 11.64(hiredmec: 1 if yes, 2 if no) + 1.47log(inputkg) + 10.13(income) + 7.57(education)

Whilst regression analysis requires independence between variables, multivariate analysis was developed specifically to deal with highly correlated variables such as the original variables. The components or classification functions (Y_1 to Y_4) determined through multivariate analysis are however independent, as is established in the subsequent analysis. A particular farmer's data could subsequently be used in this classification model. The highest value is an indication of the group in which the farmer would fit. For instance; if y_3 is the highest value obtained, the farmer would be allocated to group 3.

Using these classification functions on each of the 123 respondents, they can be classified back into the groups in order to establish the validity of the typological model. As seen in table 6.2.3, farmers were 78, 96, 84 and 100% correctly placed into groups 1 to 4 respectively.

Table 6.2.3: Number of Observations and percent classified into groups:

From group	1	2	3	4	Total
# from 1	18	5	0	0	23
% from 1	**78.26**	21.74	0.00	0.00	100.00%
# from 2	0	44	2	0	46
% from 2	0.00	**95.65**	4.35	0.00	100.00
# from 3	0	4	36	3	43
% from 3	0.00	9.30	**83.72**	6.98	100.00
# from 4	0	0	0	11	11
% from 4	0.00	0.00	0.00	**100.00**	100.00
Total	18	53	38	14	123
%	14.63	43.09	30.89	11.38	100.00

Subsequently a one-way analysis of variance (ANOVA) was done on the first PC scores to determine if the differences between the groups isolated were significant (table 6.2.4). Only the first PC was analysed, as this component had by far the most impact on variance (33%). It was clear that groups differed highly significantly ($p<0.001$) from each other (table 6.2.4).

Table 6.2.4: Analysis of group variance, using Principle Component 1 scores:

SS effect	Degrees of freedom	MS effect	SS error	Degrees of freedom	MS error	F	F probability
99.34	3	33.11	16.66	113	0.148	224.6	<0.001

A post hoc analysis was subsequently executed to determine which groups differed significantly from one another. As indicated in table 6.2.5, all groups differed significantly from all others ($p=0.00137$), illustrating that the correct variables were used as indicators.

Table 6.2.5: Post hoc analysis to illustrate significant differences between groups. Means separation through Tukey method (*Marked differences are significant at $p < .05$)

		[1] M=-1.330	[2] M=-.4137	[3] M=.62138	[4] M=1.8785
G 1:1	[1]		.000137 *	.000137 *	.000137 *
G 2:2	[2]	.000137 *		.000137 *	.000137 *
G 3:3	[3]	.000137 *	.000137 *	*	.000137 *
G 4:4	[4]	.000137 *	.000137 *	000137 *	

A last procedure was to determine the effect-size (eta-square); to illustrate the practical importance of the differences. The estimated value of 0.85 of this effect indicated a very significant effect, since an eta-square of 0.14 is considered large (Cohen, 1988).

In summation: initial descriptive statistical analysis highlighted significant variation in the population, illustrating socio-economic diversity. After the descriptive phase key variables were identified pragmatically and some combined to reduce variation, facilitate analysis and provide a farmer profile. Factor analysis used as dimension-reducing technique isolated indicators that elucidated diversity

within the community. These were used to arrive at a typology with four farmer types significantly different from one another in terms of access to resources, inclination towards agriculture and performance. The results clearly supports the hypothesis that diversity must be dealt with in agricultural support models. The results of the analytical process is described in the following sections of this chapter.

6.2.3.2 Socio economic profile

The first step in the social impact analysis of the project was a broad descriptive socio-economic profile of the target population, describing how the quality of life of participants was influenced. A summarised socio-economic profile of the representative sample group (n = 123) reads as follows: The average household had five to six members, with a coefficient of variance (CV) of 38. The average monthly expenditure (table 6.2.6) of the respondents on food, transport, savings, electricity and leisure amounts to roughly R1100 per month, but variation within the sample group was very high (CV=647). Although the average spending on leisure was R140, only half the respondents provided this information, conceivably those better off. Seventy percent of households reported at least one unemployed person (CV=60).

Table 6.2.6: Average monthly spending of Sheila ward respondents on five basic items:

	Food	Transport	Savings	Electricity	Leisure
Mean spending (R)	390	200	140	105	140
Coefficient of Variation	66	95	121	57	95

Regarding services, 76% of the households concerned had access to electricity, while 83% had a television and 32% access to a phone. Although only 26% had running water in the homestead, most had access to a public tap within 200m and in the Sheila village, most had water on site, as discussed in chapter 6.1.4. Only 24% had their own vehicle, while 32% used taxis and 43% the bus service.

Education levels (illustrated in Figure 6.2.4) of respondents were higher than that of the total population of the ward, as described in chapter 6.1.4. Whilst the largest group in the ward had a primary school education the largest group in the survey (46%) had an education level of between grades 8 and 12. Sixty eight percent of households had on average two school-going children (CV=52).

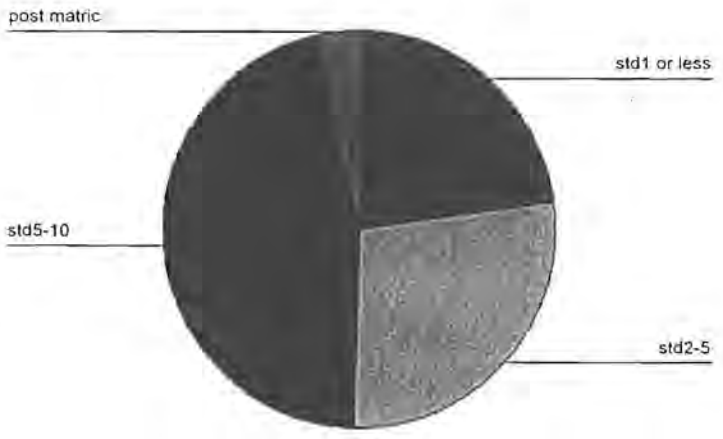


Figure 6.2.4: Education levels of respondents from three Ditsobotla villages

With regard to agricultural activity, it was noticeable that all respondents viewed themselves as farmers, although 79% stated that they had previously held other employment. Moreover, although most respondents were agriculturally active to some extent, 69% of households declared off-farm income and 55% received remittances, whilst 62% of households stated that at least one child had left the house (CV=58). Almost half (49%) the respondents declared a pension and in total, 89% stated that they supplemented their agricultural activities. All respondents were so called 'full-time farmers' for on average 17 years (CV=70). Roughly half the respondents (48%) stated that they had three sources of income, while 33% reported two income sources. Seven percent of households reported four income sources, while 11% claimed they had only agriculture as an income source. This is highly unlikely and the statement is probably due to the perception that support favours so-called 'bona fide' farmers. Given that the survey was perceived as an agricultural initiative, respondents probably over-emphasised agricultural interest throughout the survey.

In total 73% of respondents stated that they were involved in the erstwhile Sheila project and the vast majority (85%) believed that the project was beneficial to the community, although only 76% stated that they learnt more about agriculture whilst the project was in progress.

6.2.3.3 Access to land

As most villagers, respondents had access to the piece of land on which the homestead is located. The homestead yard is utilised to an extent for agricultural activities by roughly two thirds of respondents; for vegetables, poultry or fruit or a combination thereof (figure 6.2.5). Although the precise extent of agricultural yard practices was not ascertained, in most cases these activities were not intensive and contributed only to a limited extent to household food security.

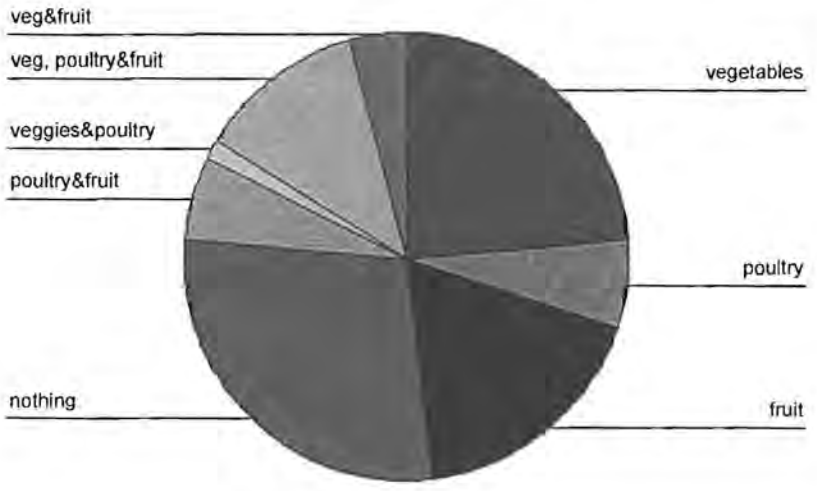


Figure 6.2.5: Utilisation of the homestead area for agricultural practices

In terms of cropping land, the average land size the 123 respondents had access to (through sharecropping agreements) was 33ha (CV = 118), but the high coefficient of variation limits interpretation. Lands were located on average seven kilometers from the homestead, although this also varied extensively (CV=642). Forty percent of respondents felt that distance to cropping fields was a constraint – primarily as control was difficult and theft a significant issue. A breakdown of available land is shown in table 6.2.7: More than half the respondents had access to between one and 15 ha, while those that had access to 16 to 30 hectares (mostly smaller sharecroppers) comprised another third. Together these farmers accounted for more than 80% of available land. Only eight farmers had access to more than 100 ha.

Table 6.2.7: Land size frequencies of ruralites from Sheila ward:

Land size (ha)	Farmer numbers	Percent
0	1	.8
1-15	65	52.8
16-30	35	28.5
31-100	14	11.4
101+	8	6.5
Total	123	100.0

For a comprehensive view, the hectares actually planted should be taken into account. The average hectares per respondent planted in the two seasons up to July 2000 were less than 19 hectares, but again with limiting variation (CV=103). Respondents had access to 3970 ha in total.

During the 99/00 season 2215 ha were planted, compared with considerably less (1130 ha) during the previous two seasons. During the 00/01 season, only 15 farmers in the study area planted, as credit availability was extremely limited. During the 1999/00 season, 56% of the respondents planted, while during the previous two seasons 30% of respondents planted. Despite this, 51% of respondents felt they required more land. The emotional and cultural value of land is significant and the overriding perception is that land is perceived as a form of security and a potential mainstay for an improved livelihood. As illustration: when respondents were asked if they would sell their land for an exorbitant price, only 5 respondents (4.2%) said yes. Contrary to the finding of Francis (1999) there seemed to be no significant shift from the security and customary value (to a market value) that land holds to most ruralites.

A quarter of respondents regularly rent land, for which 75% pay by providing a share of the harvest to the landowner. However, 60% stated that they were dissatisfied with sharecropping agreements. Attitudes toward contractors varied from 37% of respondents that had a positive view to 54% that had a negative perception of contracts, while 9% were neutral. Conflict and mistrust were described as significant constraints in crop production in the area. This led to much land not being cultivated and dwindling co-operation through sharecropping. This will be dealt with in the next chapter.

6.2.3.4 Access to inputs

Forty percent of farmers own at least one tractor, but in most cases, the state of mechanisation is poor. Most mechanisation dates back to the project era and very few farmers have capital resources for new equipment. As the project was terminated more than seven years ago, most equipment of that era is no longer functional or only barely so. Another concern is that only 36% of respondents have access to storing facilities, i.e. a store at the home, which means equipment or inputs are often vulnerable to the elements.

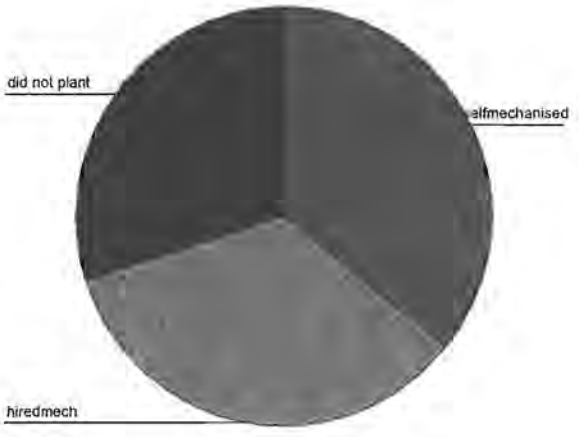


Figure 6.2.6: A breakdown of mechanisation sources for respondents of the Sheila ward

Mechanisation services are therefore often rented: Almost two thirds of all respondents (62%) indicated that they at some time hired mechanisation services for the cultivation of their allotted land. These services are rented from sharecroppers or affluent farmers in the area. Neighbouring white farmers also cultivate lands on contract. For the 1999/00 season, the division between those that used their own mechanisation, those that hired mechanisation and those that did not plant, were roughly equal, as illustrated in figure 6.2.6.

A major constraint in crop farming is that farmers plant late, usually during December and often as late as January. Only 30% of respondents thought it prudent to cultivate during spring and 34% stated that summer is the right time for cultivation. Only 36% thought that winter ploughing was the best option – a specific extension message of the past few years. A significant reason for planting late is that many agricultural decision-makers (with capital) are migrants and only return to the villages during December. The most significant reason for planting late is the lack of timely financing. Funds for cropping practices are limited and cultivation has to wait until a loan is secured or the holiday bonus of a family member becomes available. The importance of timeous planting is often not realised as 81% of respondents stated that their ploughing time was fair to good. This might also be due to the fact that the livestock from the village utilise crop residues until well into spring, complicating cultivation practices. Most respondents (86%) however felt that if they planted late the reasons were either late rains or late financing.

Most respondents (87%) buy inputs at the local NWC at Lichtenburg located 30 km to the southeast. Almost 70% of respondents used hired transport services to access these inputs. By far the majority of farmers buy only four items for cultivation, fuel, seed, fertiliser and equipment parts. Most farmers know the value of a good seed source and usually buy adapted hybrids from the co-operative. However, some farmers take grain from the previous harvest – often seed of different cultivars, mix and sift it and plant the selection. Apparently, this method could retain plant vigour for up to 6 years, circumventing a major cost. Fertiliser is most often sparingly bought and usually reflects the financial position of the farmer and not the optimal amount. The average kilograms seed and fertiliser bought are provided in table 6.2.8, although variation within the survey population again limits interpretation. These data only illustrates the significant diversity in the agricultural community. Since no indication of usage per hectare is available, no further inferences are possible from these data. However, the extent of input usage is significant, indicating significant scope for a more organised project approach.

Table 6.2.8: Kilograms of the major inputs utilised by Sheila respondents:

INPUT	MEAN (kg)	CV	MIN (kg)	MAX (kg)
Maize seed	205	95.6	50	1125
Maize fertiliser	2100	86.7	400	13 000
Sunflower seed	150	70.4	2	700
Sunflower fertiliser	1100	60.0	50	3000

In terms of labour used, 54% of respondents reported family members providing labour for key cultivation practices; mostly weeding and harvesting. On average, two family members (CV=76) provide labour for 35 days (CV=220) per annum. During these key times, hired labour also plays a

major role and 73% of respondents reported that they hired on average 11 people (CV=60) for 30 days (CV=277) per annum. The mode and average for a daily wage was roughly R15 per day. Labour plays a key role in agricultural production in the area. A revitalised project, increasing the area utilised, would therefore have a significant impact on labour requirements and subsequent economic activity.

6.2.3.5 Crop production

Respondents were asked what they thought their maize yield (as the dominating crop) under perfect circumstances would be. Only 12% of the respondents felt that 4 tons per hectare was possible, whilst 4.2t/ha has actually been determined as achievable (Bembridge *et. al.*, 1982). The majority (56%) felt that three tons per hectare was achievable. This was also the median. However, 32% of respondents felt that two tons per hectare was the most that could be produced. Results in terms of actual production for the years in question were relatively low, as can be seen from Table 6.2.9. These figures are actually flattering as they reflect the results of respondents who actually obtained a harvest, whilst 5% of those that planted did not obtain any harvest and were not included.

Table 6.2.9: Results of respondents that harvested during the 1997/98 & 1998/99 seasons:

VARIABLE	Respondents	Mean ha/yield	CV
Maize ha planted '97/98	50	31.2	101
Maize yield '97/98	46	1.7	44
Maize planted '98/99	48	29.2	69
Maize yield '98/99	40	1.7	46
Sunflower ha planted '97/98	56	25.3	76
Sunflower yield '97/98	47	0.8	71
Sunflower ha planted '98/99	69	24.3	88
Sunflower yield '98/99	57	1.0	67

The average production for maize and sunflower is 1.7t/ha and 0.9t/ha respectively, which is relatively low. However, it must be recognised that the input costs per hectare for most respondents are also relatively low. The minimum fertiliser is used and often seed from the previous yield is 'recycled' as explained. If an average for three years is determined and recalculations done for farmer groups (as a first attempt to deal with diversity), an upward trend is evident (see table 6.2.10). The group with the standard 15ha had lower yields than those with less than 10ha, who plant on average less than 5 ha more intensively. Again, results must be viewed with circumspection, given the high variation in data.

Table 6.2.10: Production data for different size of land holdings planted.

Mean ha planted	**% of respondents**	**Mean maize yield**	**Mean sunflower yield**
Not planted	13	0	0
<10ha	25	0.5	0.32
10-15ha	30	0.33	0.55
16-45ha	25	1.09	0.33
>45ha	7	1.36	0.67

Respondents were also asked how many bags of maize they usually hold back for household consumption. The majority (45%) kept 11 to 25 bags, while another 28% kept 26 to 50 bags of maize in storage. The mean was 24 bags (CV = 44). Only 17% did not hold back any bags for consumption.

6.2.3.6 Constraints in crop production

The most serious constraint in cropping was identified as access to finance: More than 40% of farmers stated that the lack of financial services was the most serious constraint. In fact, three quarters of all respondents felt that it was extremely difficult to obtain credit. This is linked to the high level of debt in the community since the project era, as well as a lack of security. Previous analyses (Bembridge, et. al., 1982; Stilwell; 1985) and recent interaction with the Landbank established that farmers often do not appreciate or understand the credit process. Landowners with access to 15 ha could during 1999 only apply for production loans, while those with access of 75 ha or more could obtain broader finance.

Farming conditions are currently seen as difficult, due to high input cost and lack of finance. Some farmers speculate that they were better off when animal traction was still used, arguing that although production was lower, the relative value of the harvest was higher than today. Others felt that during the project, farming conditions were favourable, as management buffered then against risk. Although there was little freedom in agricultural choice, income was secured. For 1999/2000, only 15 farmers at Sheila obtained credit. Drought (15% of farmers) and theft (14% of farmers) were also perceived as the major constraints, while mechanisation (linked to financial constraints) was the most pressing constraint to 19% of farmers. Only 6% thought that management skill was the major problem. Responding to a new question, 60% found access to inputs a problem while 20% found marketing produce a significant constraint. Relating to theft, 75% found the lack of fencing a serious problem. Only 19% found that community conflict is a problem. These constraints are illustrated in figure 6.2.7:

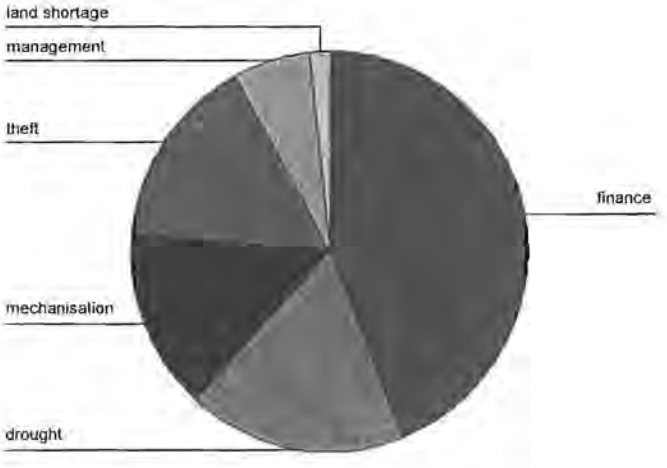


Figure 6.2.7: Constraints in crop production as perceived by respondents from Sheila ward

6.2.3.7 Livestock farming

Livestock farming at Sheila is not a major enterprise, as seen in table 6.2.11. Most respondents (43%) reported no animals while the remainder generally had only limited stock. Only 12.5% of households had more than 20 animals. The average number of animals per respondent is under ten and includes cattle, sheep, goats, donkeys and pigs.

During the early 1980s the vast majority (74%) had less than 6 head of cattle, the number required to satisfy primary needs. Since then cattle numbers dropped significantly, following a decrease in grazing land and an influx of people, reported by respondents. Indirectly these settlements caused a further reduction in livestock, as theft significantly increased during the past two years. Mortality and limited marketing (less than 10% of respondents reported selling) further inhibit the enterprise. Twenty percent of cattle owners reported mortality with an average loss of three animals p.a., representing a significant economic loss. Mortality was mainly subscribed to disease (55%), drought (24%) and feed shortages (17%). Only 27% of respondents reported reproduction, with an average of three calves p.a., whilst 2.4% reported purchasing stock. Only 18% had sheep, 9% goats, another 9% donkeys and 6% pigs. Only 30% reported having poultry. This suggests that although livestock plays a part in rural households, in most cases this does not constitute a production-oriented enterprise. Cattle are primarily kept for household milk production, as a form of security, an asset to fulfil social obligations and as investment. Small stock and poultry is kept mainly for home consumption.

Table 6.2.11: A compilation of livestock types (excluding poultry) of respondents from Sheila ward

Animal numbers	Respondents %
0	43
1-5	10
6-10	16.5
11-20	18
21-44	11
44+	1.5
Total	100

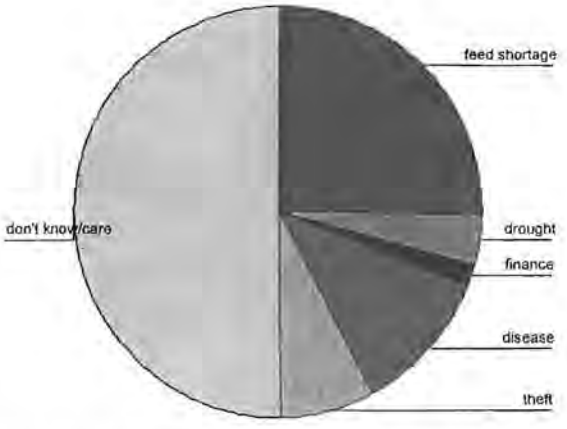


Figure 6.2.8: Serious constraints in livestock farming, as perceived by Sheila farmers

Of the 50% of respondents that answered the question regarding the most serious constraint in livestock production (fig 6.2.8), half mentioned feed shortage, and another 20% disease and 14% thought that theft was the most serious problem. In terms of fodder flow, animals almost exclusively made use of the overgrazed communal range and crop residues. Half the respondents realised that the range is in poor condition (51%), but 33% believed it to be fair and 16% perceived it as good.

Only 28% of respondents bought feed while 19% bought medicine when required. Only 17% reported income from livestock, with a mean of R2350 p.a., but with a high CV of 132, indicating high variation and again illustrating economic diversity in the community. Comparing this with the 40% of respondents that bought fodder and 20% that bought medicine, illustrates that stock is not primarily kept for its economic contribution. Annual costs for fodder and medicine are shown in table 6.2.12:

Table 6.2.12: Summarised spending of Sheila ward respondents on fodder and medicine.

VARIABLE	% respondents	MEAN	CV	MIN	MAX
Fodder cost	28	R961	172	30	7500
Medicine	19	R385	179	15	2500

6.2.3.8 Support

A third of respondents belong to a formal farmers' organisation, although this refers mainly to sporadic attendance of study group meetings. When given several options with regard to where respondents could obtain information, the extension officer stood out as the most important source. However, neighbouring farmers, the co-operative and a combination of these, are the basis of all information systems. Most farmers do access various sources of agricultural information (Figure 6.2.9).

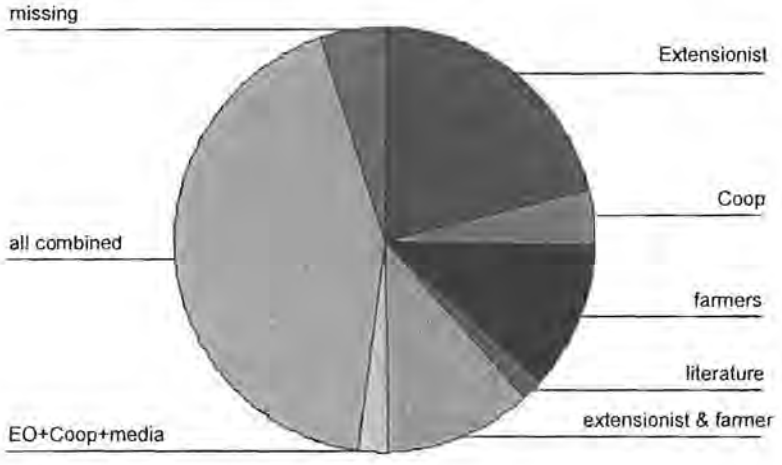


Figure 6.2.9: Agricultural information sources of ruralites from Sheila ward, Ditsobotla

Since the project was terminated, support to the farmers of Sheila diminished significantly. It is difficult to obtain credit, and access to inputs is constrained not only by lack of direct funding, but also by logistical problems such as lack of transport. Another obvious constraint is the lack of technical knowledge, although all respondents do not perceive this as a serious constraint. When asked what their training needs (fig 6.2.10) were, 39% felt that they did not urgently need specific training. However, 24% felt that training on cultivation practices would be useful, while 17% perceived financial management training as important. Training with regard to mechanisation, was the priority of 15% of the respondents.

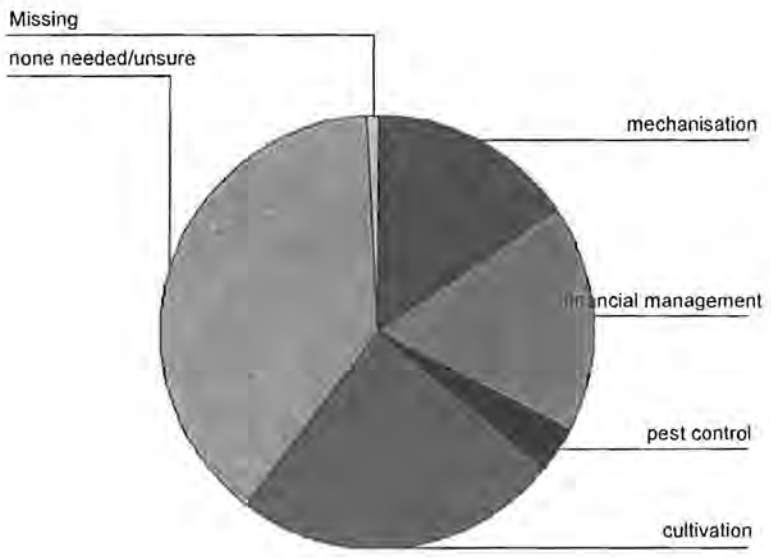


Figure 6.2.10: Training needs as perceived by respondents from the Sheila ward

6.2.3.9 Defining a farmer typology for the Sheila project

Although the previous section provides some insight into the agricultural status of the community and the impact the project had on participants, a distinct remaining impression is that results are vague, due to the high variation, i.e. the extensive diversity within the sample community. This is clearly illustrated by the high coefficient of variation (CV) values. This indicates diversity and highlights differences in agricultural prowess through differences in access to resources and services. Rural diversity clearly impacts on performance and should be quantified.

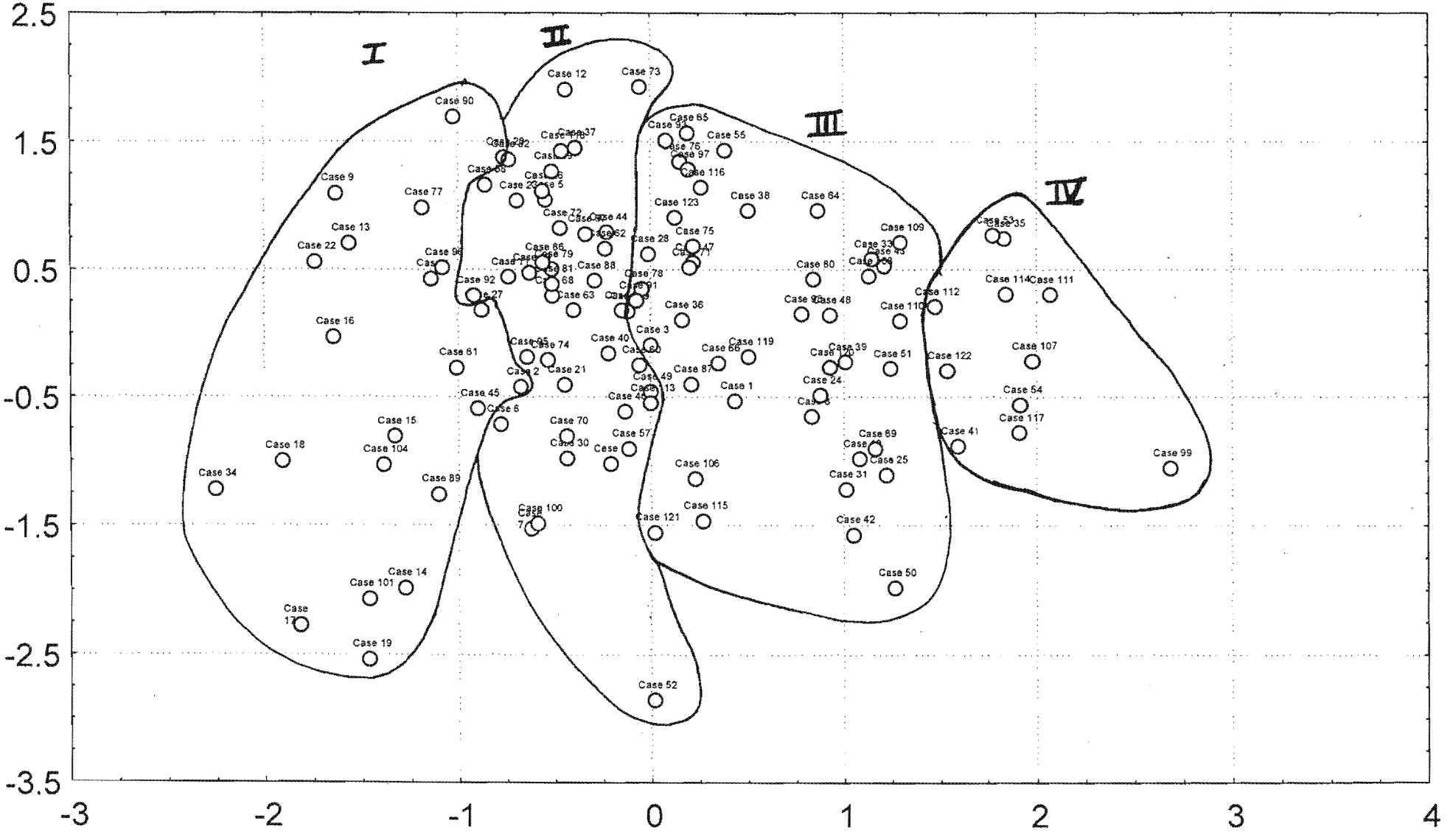
As argued extensively throughout this study, a typology could highlight constraints within more homogeneous groups and therefore facilitate focused support. The institutional impact and LFA established that project planning and implementation was not optimal, especially if evaluated with the project design criteria established with this study. In particular diversity was ignored, although it was described superficially in the analysis by Bembridge *et. al.* (1982), who proposed 'a development plan based on a differentiated strategy'. Dealing with diversity would facilitate sound development strategies and projects and therefore enhance the recognition of social reality, the development of linkages and applicable HCD.

As described in a previous section (6.2.3.1), dealing with the statistical procedures used, a limited number of key variables, responsible for most of the variation, were identified. These variables represent key farmer efficiency criteria, impacting mostly on variance or diversity. They include socio-economic aspects, resource access and crop and livestock performance criteria:

Education, household expense and household size
Number of incomes (pension, remittances, business, etc.)
Mechanisation (own/hired), land (available & planted), inputs used (kg seed, fertiliser), yields
Animal numbers (cattle, small ruminants, pigs, and donkeys)

As described in section 6.2.3.1 a PCA (principle component analysis) was subsequently done to group farmers, facilitating the determination of the types of the typology. The determination of the actual groups was a pragmatic process, informed by the PCA illustrated in figure 6.2.11. Through the long term engagement with the community, spatial distribution of respondents in the PCA, and comparing these with quantitative values obtained for the ten isolated variables, it was decided that four relatively homogeneous groups could be isolated in a model describing the 123 participants. Although the model will need to be adapted according to the area in which it will be used, it should have wider applicability. The four types developed from the principal component analysis are illustrated in figure 6.2.11 where PC 1 is plotted against PC 2. As PC one describes four times more variance than PC two, focus should be more on the horizontal axis. Inactive landowners are plotted between -0.75 and -2.25, opportunists between -0.75 and -0.25, sharecroppers between -0.25 and 1.25 and commercialising farmers between 1.25 and 2.75. As described in the statistical analysis procedure (chapter 6.2.3.1) this typology tested repeatedly as highly valid, whilst differences between all four groups were highly significant. The typology is therefore a representative model of agricultural types in the Sheila area.

Figure 6.2.11: A two-dimensional representation of survey respondents from a Principal Component Analysis, according to ten key criteria (y-axis = PC2 & x-axis = PC 1



The first group (the 24 most left circles or individuals in figure 6.2.11) represents respondents described in this study as 'inactive landowners'. Their characteristics as determined by the key criteria are described in table 6.2.13. It is obvious that this group does not fit the profile of a typical emerging farmer. The absence of any yields and thus food production is disturbing, especially as some input costs were committed. The small area cultivated suggests a subsistence type of enterprise or rather one of several livelihood strategies followed by a major part of the rural population of the province.

Table 6.2.13: A description of 'inactive landowners' of the Sheila typology, according to the key criteria established:

Inactive landowners: 19% of farmers	Have 15 ha available Less than half plant one to three hectares, with hired mechanisation Basic primary school education Spend R760 on food, transport, electricity, savings & loans per household of 5.6 Have 2.3 sources of income Buy on average 760 kg in seed & fertiliser/season Do not produce any grain Own roughly 6 head of livestock

The second group (the next 46 circles or individuals to the right in figures 6.2.11) represents respondents described in this study as 'opportunists'. Their characteristics as determined by the key criteria are described in table 6.2.14. This group represents opportunists, as their agricultural activity varies according to the resources and opportunities available during a particular season. While these farmers most often do not have their own mechanisation, they obtain these services through contractors. Noteworthy is the slightly higher sources of income, the yield, although still relatively low and the area utilised.

Table 6.2.14: A description of the 'opportunists'-type of the Sheila typology, according to the key criteria established:

Opportunists 37% of farmers	Have between 10 and 30 ha available Plant on average 9 ha Less than one in ten has a tractor Basic primary school education Spend R800 on food, transport, electricity, savings & loans per Household of 5.3 Have 2.4 sources of income Buy on average roughly 1200 kg in seed & fertiliser/season Produce 0.3t/ha of maize grain and 0.4t/ha sunflower Own, on average, less than 6 head of livestock

The third group (the next 44 circles or individuals to the right in figures 6.2.11) represents respondents described in this study as 'entrepreneurs'. This group plants significantly more hectares, have in the main better access to mechanisation and employ more livelihood strategies. Also significant are the higher input quantities and better yields. Although this group certainly does not conform to an ideal emerging farmer group, there is obvious potential. Their characteristics as determined by the key criteria are described in table 6.2.15.

Table 6.2.15: A description of 'entrepreneurs' of the Sheila typology, according to the key criteria established:

Entrepreneurs 35% of farmers	Have between 10 and 150 (average 40) ha available Plant 25 ha on average Two thirds have tractors and others use hired mechanisation. Average 1.3 tractor Primary school education Spend R1000 on food, transport, electricity, savings & loans per household of 5.3 Have 2.7 sources of income Buy on average roughly just under 2400 kg in seed & fertiliser/season Have average yields of 1t/ha for maize and 0.5t/ha for sunflower Own less than 10 head (8) of livestock

The final and smallest group (the 11 most right circles or individuals in figures 6.2.11) represents those respondents described in this study as commercialising farmers. This most affluent group is the first for which the land holdings could be considered in terms of efficiency, particularly given the average of two tractors per owner. However, the actual planted area is still questionable in terms of economic viability. This group has a significantly higher education, income, household-spending and larger crop and livestock enterprises. Their characteristics as determined by the key criteria are described in table 6.2.16:

Table 6.2.16: A description of type four of the Sheila typology, according to the key criteria established:

Type of farmer	Description
Commercialising farmers 9% of farmers	Have between 30 and 300 hectares, with an average of 115 ha available Plant between 25 and 165 ha with an average of 76 ha Do their own mechanisation and own two tractors Have a high school education Spend R1800 on food, transport, electricity, savings & loans per household of 5.4 Have more than 3 sources of income Buy on average roughly 6000 kg in seed & fertiliser/season Have average yields of 1.7t/ha for maize and 0.6 t/ha for sunflower Own, on average, more than 40 head of stock, some much less

6.2.3.10 Summation of social project impact

Social impact analysis entailed a qualitative phase complemented by a quantitative questionnaire. It was established that most respondents were agriculturally active, while in total, 89% supplemented agricultural income. The vast majority (85%) perceived the project to be beneficial, but only 76% felt they had gained skill through the project. The average respondent had access to 33ha; with only eight having access to more than 100 ha. The average hectares planted were less than 19ha, but still 51% felt that they required more land. The state of mechanisation is mostly poor and therefore 62% indicated that they hired mechanisation services. The primary constraint in cropping was access to finance. Livestock farming at Sheila is not a major enterprise. Only 17% reported income from

livestock, with high variation. This description was augmented with the objective of this section; a typology summarised in table 6.2.17.

Table 6.2.17: A summarised description of the four groups of the typology for the Sheila ward:

Farmer Type	Ha	Used	Mechanisation	Hh $	Yield/ ha*	Input kg	Education	Hh size	Inc. #	Stock #
Commercialising	110	75	Own	R1800	2.3	6000	3	5.4	3.1	43
Share-Cropper	40	40	70% own	R1000	1.5	2400	2.3	5.3	2.7	8
Opportunist	15	9	92% hire	R800	0.7	1200	2.1	5.3	2.4	6
Inactive Landowners	15	1	hire	R750	0	760	2.3	5.6	2.3	6

*Data represent a figure, combining maize and sunflower yield to be used only as a means to distinguish types

Rural diversity impacts on agricultural performance and should be quantified. The hypothesis that diversity must be dealt with to enhance project performance, is hereby proven. Support strategies for these different types should clearly differ, although it is feasible that all types could be provided for in a project. Serving farmers according to type will enhance clarity of the client profile, facilitate appropriate strategy per type and enhance development. Given the constraints expressed by all types the potential for a project approach as support model is significant.

6.2.4 Financial & economic impact

6.2.4.1 Introduction

This analysis includes a financial and economic impact determination for participating farmers and the project as a whole. However, interpretation was hampered by a dearth of reliable records pertaining to specifically input usage and yields. The ARDRI team (Bembridge, *et. al.*, 1982) during the 1980s analysis also raised this and the DBSA team (Stilwell, 1985) had the same complaint. Those teams had access to records of the NWC, who at the time were responsible for project management, and these are again used. Quantitative data has since then been difficult to obtain. According to extension personnel active during the project, data was lost during the political changes of 1994. Through the questionnaire it was possible to gather current data, although only a few farmers were clear on input costs and precise yield in tons per hectare. The majority describes yields in terms of bags or wagon loads with an unknown capacity. The verification of data through comparison with that obtained from other, similar studies and certain assumptions, was used to circumvent this problem.

Financial analysis focuses on the business prospects of a project. It deals with revenue earning considerations, with profit being calculated at market prices. In this manner capacity for income at two levels, farm and project level, is determined (Gittinger, 1982). Sources that reflected the going prices for inputs and outputs of the project were used. The objective was to establish if direct costs (representing all associated production and capital costs) were covered by after tax income, thus creating incentive to participate (Van Rooyen, 1986). At farmer level, basic crop enterprise input cost with corresponding yields, sales and household consumption figures were sourced. For financial

analysis for the agents, cost estimates and the fiscal impact of the project was determined. This included values of goods and services needed to initiate and maintain (investment and running cost) the project (Van Rooyen, 1986); i.e. infrastructure, financing, staff, training, marketing, storage, effect on balance of payment. Output dealt with entailed yields and sales.

6.2.4.2 Describing the "without project' scenario

A description of agricultural activities without the project is appropriate, as the difference between the project and the 'without project' scenario provides a sound indication of the value of that project. Certain assumptions had to be made for this comparison, and these are described.

According to work done by Seobi (1980), land holdings in the area before the project (during the late 1970s), varied between 3 and 30 hectares, but were generally smaller than 5ha, to the extent that they were not viable. More than a third of all land right holders did not cultivate, due to a lack of capital, limited credit facilities and debt (Bembridge, *et. al.*, 1982). Production did not vary significantly from a mean yield of 500 kg per hectare. However, the few commercially inclined farmers with better tillage, weed control and fertiliser practices achieved considerably higher production levels, supporting the diversity principle. Redelinghuys (1981) also found that a limited number of farmers were actively cropping, with the remainder hiring out their land to other farmers, through sharecropping agreements. Less than half the farmers bought inputs such as fertiliser and then at very low rates. During 1980, average gross income for crops and livestock was R529 and R161 respectively, while the net return per farm was R315. In terms of 1994 values this would roughly be R3070 for crops and R930 for livestock, providing a net return per farm of ±R1800. The implication is that most farmers lived below the subsistence line (Seobi, 1980). Adoption rates of sound cultivation practices were low and fertiliser rates too low to be effective.

Results from recent studies by this researcher in communities adjacent to the project area indicate that 70% of ruralites still cultivate less than 15ha, with only a quarter cultivating more than 50ha. Less than a third of Ditsobotla and Mafikeng landowners currently cultivate, indicating that cropping decreased significantly during recent years and production figures are now similar to those of the late seventies. Sharecropping remains the main cultivation model. Average yield data for the period 1997/98 until the 2000/01 seasons, vary between 1.3 to 1.7t/ha for maize and between 0.6-0.9 t/ha for sunflower (Verschoor 2002a; 2002b).

However, entrepreneur-type farmers in the Ditsobotla and Mafikeng districts do exist. These types of farmer bought 280kg of maize seed on average, during the 2001/2002 season. The average fertiliser purchase was 1.6ton. Hired labour on average entailed 4.6 people per season while 2.7 family members provided labour during stages of the production process. This type of farmer cultivates 50 hectares of maize on average, from which an average yield of 1.9t/ha was realised. Respondents on average had 40 head of livestock, mostly cattle. Only 28% of respondents reported income from this enterprise, with an average of R7500 p.a., although variation was extremely high. The average farmer bought 1.2 tons of fodder at a cost of R1130 and spent R700 on animal medicine p.a. On average,

respondents spent R1100 on basic household items (as described in the social impact section), but variation was very high (Verschoor, 2002b). These results are similar to those obtained from farmers in the entrepreneurial and commercialising type of Sheila typology.

The 'average farmer' situation differs widely, underlining the need for recognition of diversity. Data for two villages illustrate this: the average area planted under sharecropping at Vryhof (in the Mafikeng district) is just under 5ha, while 29ha are planted on average at Bodibe (in Ditsobotla). At Bodibe 150kg maize seed is bought per respondent in a season, while 70kg is bought at Vryhof. At Vryhof average amount of fertiliser bought is 1 ton while at Bodibe it is 0.5ton. Hired labour amounts to 2-4 people per season, with a family member also involved. Average yields for this group is lower at one ton maize per hectare at Bodibe and 0.5 ton/ha at Vryhof.

At Vryhof the focus is on livestock with average herds of 40 head compared with 17 at Bodibe. Stock income of R1500 p.a. at Vryhof and R1800 p.a. in Bodibe compared poorly with direct costs of R800 and R150 p.a. at Vryhof and Bodibe respectively (Verschoor 2002a).

Clearly differences between farmer types are vast – both in terms of cropping and the livestock enterprise. What is particularly disturbing is that despite a small number of Ditsobotla farmers planting areas compatible with those during the project era, yields are roughly 20% lower. Various explanations are possible. Input-usage is significantly lower than during the project era. Especially fertiliser is sparingly used. Weed control is mostly mechanical and most often sub-optimal. Mechanisation is often also of a poor quality, with especially primary cultivation practices being sub-standard; i.e. power-output of tractors is insufficient to ensure thorough ploughing.

It is assumed that without a project intervention, expansion of agricultural activities from before the project would have occurred. However, the total area planted currently is not significantly higher than during the seventies, although a few sharecroppers individually do plant larger areas. It is therefore assumed that in a without project scenario, a typology with roughly the same four farmer types would exist. Percentages of farmers in the higher performing types would however have been significantly lower, as the opportunities created by the project would not exist.

Based broadly on the studies described above, and experience with farmers in the area, with assumptions regarding input costs for 2000, a Sheila typology, for a without project scenario is described in table 6.2.18 for the crop enterprise and in table 6.2.19 for the livestock enterprise. It is assumed that 140 farmers would have been active without the project, of which 5% would be 'commercialising', 12% 'entrepreneurs', 18% 'opportunists' and 65% 'inactive landowners'.

According to the extension manager of the Sheila ward, there is practically no communal grazing available in the Sheila ward, due to an influx of people, as reported earlier. Farmers most often keep their cattle at a 'cattle post' outside the ward.

Table 6.2.18: 'Without project' financial analysis for maize, for Sheila farmers during 2000:

	Ha-used/ farmer	Input costs/ha*	Yield/ha	Total ton*	Maize price /ton	Income /ha (R)	Profit/h (R)	Profit/los s/farmer
Inactive l/owners	2	600	0.5	91	810	405	-195	-390
Opportunists	10	650	1.0	250	810	810	160	1597
Entrepreneurs	25	850	1.8	744	810	1417	567	14175
Commercialising	50	1000	2.0	700	810	1619	620	30971

*Input costs determined with help from provincial agricultural economists
*hectare planted x yield/ha x % of 140 of farmer type

Table 6.2.19: 'Without project' financial analysis for livestock for Sheila farmers, during 2000:

	Livestock #*/farmer	**Livestock costs*/farmer**	**Livestock income (p.a.)**	**Livestock profit/farmer**	**Total livestock#***
Inactive l/owners	5	530	600	70	455
Opportunists	10	560	1300	740	250
Entrepreneurs	20	600	2000	1400	340
Commercialising	40	1800	6000	1200	280

Figure includes mostly cattle, but also some small stock, pigs and donkeys
*fodder, vaccination, dip, medicine, lick
*based on percentages of type in typology

Important to note is that the financial analysis described in tables 6.2.18 and 19, is based on data obtained from studies in adjacent communities (Verschoor 2002a; 2002b). Given the accuracy of farmers' data and the general constraints in obtaining quantitative data described in the introduction, these data must be used with circumspection. Whilst it is valuable for descriptive comparison and trends, it should not be viewed in absolute terms.

6.2.4.3 The 'with project' scenario: a farmer level analysis

A significant variation in profits was achieved throughout the project's lifetime (1976-1994) and inconsistent performance concerned farmers, management and evaluators. The ARDRI evaluation (Bembridge *et. al.*, 1982) indicated a range of farmer performance from most successful to unsuccessful, for the initial four project years. This was evident in the range of coefficients of variance recorded.

The DBSA evaluation (Stilwell, 1985) also found the same trend, exacerbated by extensive drought during the early 1980s. Variation in yields and profits indicate that variation in farming aptitude and attitude existed (Bembridge et. al., 1982), as illustrated in table 6.2.20. This constitutes project management's failure to align strategies to the design criterion of dealing with diversity.

Table 6.2.20: Average maize income and cost parameters per farmer group at Sheila: 1976-1980 (Bembridge et. al., 1982)

	Contractor farmers				Other participating farmers			
Item	Top third	Middle third	Bottom third	All	Top third	Middle third	Bottom third	All
Yield/ha	3.2	2.4	2.4	2.7	2.5	2.2	1.8	2.2
AGI	11916	8962	7395	9494	4365	3423	2401	3400
GI/ha	397	299	246	316	291	228	166	227
ATC	7040	7192	7598	7286	2572	2510	2695	2592
TC/ha	235	240	254	243	171	167	180	173
ANFP	2973	-530	-2107	305	1793	913	-294	831
NFP/ha	99	-4.4	-70	10	120	61	-20	54
ADR	1765	1788	1853	1788	624	688	740	702
DR/ha	59	60	62	60	42	46	49	47
AFFI	3111	-18	-2056	1679	1438	228	-1034	106
FFI/ha	103	-0.6	-69	56	96	15	-69	7

LEGEND:
AGI = average gross income (value of maize sold/consumed)
GI/ha = gross income per hectare
ATC = average total cost (al costs related to production)
TC/ha = total cost per hectare
ATC/ha = average total cost per hectare
ANFP = average net farm profit (gross income-depreciation)
NFP/ha = net farm profit per hectare
ADR = average Debt repayments
DR/ha = debt repayments/ha
AFFI = average family farm inc. (consumption value + excess)
FFI/ha = family farm income per hectare

For the first four years of the project, 30% of all farmers were unable to earn net farm profits. Only 40% of contractors recorded positive net farm profits, despite impressive profits earned by the project as a whole (Bembridge *et. al.*, 1982). The top third compared favourably with commercial SA farmers, while the rest did not produce income to compare with other income groups in Bophuthatswana. Although average net farm profit increased over the years, variation remained marked, despite uniform practices. Practices (e.g. weed control), rather than soil potential caused most variation. Virtually all of these were done by the contractor and supervised by management. The majority of farmers absented themselves from any agricultural practices, indicating that project management effectively farmed on behalf of participants.

An analysis during 1999/2000 established that maize production at Sheila on the average 30ha cultivated, yielded 1.7t/ha while the average 25ha under sunflower yielded 0.9t/ha. High coefficients of variation values were again encountered, re-establishing the impact of economic diversity in the agricultural community. Sheila farmers participated in the project until 1994, for an average maize production of just over 2t/ha. These farmers today obtain maize yields roughly 20% lower and not significantly higher than that achieved in adjacent areas, not part of the project.

These data establish that financial analysis without recognition of diversity would have no value. Therefore, relevant data per farmer type was evaluated by re-analysing data from a previous project evaluation report (Bembridge et. al., 1982). Farmers were grouped into three categories, i.e. top, middle and bottom groups, on the basis of net farm profit per hectare. Farmers were also divided into

contractors and other participants. Minor discrepancies do not affect major trends and conclusions. Adapted data for the initial project is provided in table 6.2.21, while table 6.2.22 describes the data collected for farmer-types during the quantitative survey, after project termination, during 2000. Input costs were combined in one figure, as this is the format in which the data are available. These figures represent all direct costs, i.e. fuel, labour, mechanisation, seed, etc., adequate for this analysis.

Table 6.2.21: Maize enterprise input cost and output data for farmer groups for 1976-1980:

	Ha-used	Input costs/ha*	Yield/ha	Average NFP	Livestock numbers**	Livestock cost/farmer	Livestock inc./farmer
Contractor top 1/3	30	235	3.2	2973	20	120	217
Contractor middle 1/3	30	240	2.4	-530	10	120	217
Contractor bottom 1/3	30	254	2.4	-2107	5	120	217
Participant top 1/3	15	171	2.5	1793	10	60	105
Participant middle 1/3	15	167	2.2	913	6	60	105
Participant bottom 1/3	15	180	1.8	-294	3	60	105

*costs calculated as percentage of income, obtained through a earlier analysis (Bembridge, et. al., 1982)
**Figure includes mostly cattle, but also some small stock, pigs and donkeys

Table 6.2.22: Relevant input cost and output performance data for the Sheila typology for 2000:

	Ha-used	Input costs/ha*	Yield/ha	Average NFP/ha**	Livestock numbers**	Livestock costs****	Livestock income	Livestock profit
Inactive landowners	1	600.00	0	-600	5.6	530	623	93
Opportunists	9	650.00	0.7	-14	5.7	558	1 280	722
Entrepreneurs	40	850.00	1.5	365	7.9	1 049	1 574	525
Commercialising	75	1000.00	2.3	862	43.3	2 697	5 227	2 530

*Cost, determined with provincial agricultural economists, based on collected data
**based on maize price of 809.71 multiplied by yield for income, minus input cost
***Mostly cattle, with some small stock, pigs or donkeys, but based on cattle equivalents
****include fodder, lick vaccination, dipping, and other medicine-costs

Strictly speaking, the two scenarios described in table 6.2.21 and 6.2.22 cannot be compared directly: again emphasising the lack of a timeline of typology data. However, an interesting trend is obvious: during the 18 seasons of its existence, the project had average maize yields of 2.07t/ha. Currently, average maize yields at Sheila are 1.7t/ha, a drop of roughly 20%. In fact, only commercialising farmers (9%), currently perform at higher levels than the average achieved during the project's existence. If the arbitrary groups used in the ARDRI evaluation are viewed, all groups performed better than the average production today. Given the improvement in technology over the past 20 years, this entails a serious project failure in terms of sustainable development. Particularly disturbing is that both inactive landowners and opportunists are experiencing net losses in terms of agricultural activity during the season evaluated. This to an extent explains the current low cultivation levels.

Farmer type also results in significant differences in livestock numbers and performance as established in tables 6.2.21 and 6.2.22. Although both the ARDRI evaluation and this study questioned the livestock enterprise's viability given the size of most family herds and the lack of sufficient grazing at Sheila, small profits were recorded. Commercialising farmers that have sufficient animal numbers recorded a profit of roughly R2500 p.a. or R210 per month. This excludes managerial and labour costs.

Typology data for a number of years is required to facilitate cost benefit analysis with internal rates of return and cost/benefit ratios. The recently established scientific typology differs from the arbitrary grouping used previously, in terms of the number of types. A timeline of data is not available for the groupings established. Using assumptions to create performance data would only confirm what is already established - that groupings differ in performance. This makes direct comparison problematic, although the similar trends found substantiate the hypothesis of diversity as indeed correct. Farmer level analysis established beyond doubt that economic diversity and a typology exist in the area, with different types of farmers having various levels of access to inputs, leading to various levels of performance. Finally, in Table 6.2.23 the combined crop and livestock enterprise income 'without project' is compared with the combined crop and livestock enterprise income 'with the project'.

Table 6.2.23: Agricultural performance for individual farmers of the Sheila typology, during 2000:

'Without project'			
	Livestock profit	**Crop profit/loss/farmer**	**Total income**
Inactive landowners	70	-390	-320
Opportunists	740	1 597	2 337
Entrepreneurs	1 400	14 175	15 575
Commercialising	1 200	30 971	32 171
'With project'			
	Livestock profit	**Crop profit/loss/farmer**	**Total income**
Inactive landowners	93	-600	-507
Opportunists	722	-125	-28
Entrepreneurs	525	14 583	15 109
Commercialising	2 530	64 675	67 205

During 2000 inactive landowners in both scenarios were unable to make a profit. Farmers of surrounding areas that did not participate in the project and are of the opportunist, entrepreneurs and commercialising farmer-type, were profitable in their livestock and crop enterprises, while only entrepreneurs and commercialising farmers that previously took part in the project were profitable.

From table 6.2.23 it is obvious that entrepreneurs of surrounding areas were slightly more profitable than entrepreneurs previously participating in the project. The implication is that except for the commercialising farmers, the project was actually financially detrimental to participants. These values for agricultural activity for the two scenarios prove that in financial terms, on a farmer level, initial project benefits were not sustainable.

6.2.4.4 Project level analysis

While the analysis of the farmer budget provides an indication of the impact of the project on the individual farmer, it does not provide information on the effective allocation of funds spent to create the environment (the project) in which the farmer is operating. At this level, the project benefits and costs

of the agent (in this case the public service of Bophuthatswana and the NWC Co-operative) must be quantified.

An important step in this analysis is to categorise all direct benefits, direct costs (production and other allocatable costs), running costs (salaries, overhead and capital expenditure) and investment costs (infrastructure, mechanisation equipment, demarcation, etc.).

According to the NWC, capital investment in the project was amortised over five year periods. Exact figures for the first five years were used. It was stated with a previous analysis (Bembridge, *et. al.*, 1982) that the investment costs over the first five-year period would be repeated in consecutive five-year periods. Using this assumption, investment cost after the first five years therefore entails R80 525 p.a. for the 18 years that the project ran.

Another factor taken into account is loan capital. During the project lifetime, capital had been provided on credit. However, debt repayment was poor: For the 1981-1990 decade, R322 million was advanced at the Ditsobotla projects, of which roughly 60% was recovered, 20% was written off and 20% remained outstanding. Debt write-offs were regularly done, as in 1992 another R36 million were written off. During 1985, average 15 ha farm debt was R715/ha. Given the 3600 hectares involved in the greater Sheila project, this constitutes a debt of R2.7 million. It is assumed that 40% of all capital loaned was not recovered. Given the 1985 scenario, this constitutes a cost of R1.1 million over the 8-year period until the 1983/84 season. This entails a further annual cost (loan cost) of 135 000 p.a.

The opportunity cost for capital (realistic discount rate) was difficult to evaluate, due to a lack of uniformity. The determination of this parameter is intricate and beyond the scope of this study. Therefore the rate used in a previous analysis (Bembridge, et. al., 1982), based on the long-term loan rate offered by the Landbank (12%), is a realistic market related discount rate.

This analysis does not include the current value of infrastructure such as buildings. According to Gittinger (1982), these sunk costs incurred during an investment period were necessary, but cannot be retrieved as a residual value. It is therefore not an opportunity cost and not included in this analysis.

The results figure in table 6.2.24 for the total Sheila project. They represent the following statement:

Net benefits or present value = project benefits – project costs.

Incremental net benefit flow is subsequently calculated by subtracting all relevant costs from the net benefits. These incremental net benefit flows over the project years were converted into values that can be compared by discounting, allowing the taking into account of the time value of money. All values are discounted to the base year: 1995. The sum of discounted incremental net benefits provides net present value (NPV). The IRR as the discount rate where net present worth of costs is equal to net present worth of benefits, as well as the benefit-cost ratio, are also provided.

Table 6.2.24: Financial incremental net benefit, Benefit-Cost ratio, NPV and IRR, as determined for the Sheila project:

Year	Profit maize	Livestock profit	Total with project income	Running cost (salaries, etc.)	investment cost (infrastr., mech.)	Loan cost (debt)	Total cost	Project net benefit	Real project benefit	Real without	Incremental net benefit
1976	175,597.52	11,079.71	186,677.22	20,000.00	288,253.00	44,062.50	352,315.50	(165,638.28)	(1,762,109.31)	786,496.88	(2,548,606.20)
1977	201,541.21	10,292.30	211,833.52	24,304.76	23,913.68	49,218.75	97,437.19	114,396.33	1,089,488.84	789,367.73	300,121.12
1978	261,328.04	9,781.04	271,109.08	33,815.47	15,057.51	54,375.00	103,247.98	167,861.10	1,447,078.45	902,650.64	544,427.81
1979	303,895.27	11,330.59	315,225.86	42,548.72	34,217.50	61,406.25	138,172.47	177,053.39	1,351,552.59	928,488.70	423,063.89
1980	303,550.49	17,674.86	321,225.35	49,142.86	92,622.82	69,843.75	211,609.43	109,615.92	735,677.34	848,544.62	(112,867.28)
1981	369,761.22	27,121.22	396,882.44	56,285.71	151,079.86	80,625.00	287,990.58	108,891.86	633,092.23	923,332.60	(290,240.37)
1982	381,088.38	21,506.83	402,595.21	63,428.57	170,252.43	92,343.75	326,024.76	76,570.46	388,682.53	802,676.20	(413,993.67)
1983	560,017.18	19,841.73	579,858.92	70,571.43	189,425.01	104,062.50	364,058.93	215,799.98	972,071.99	1,006,532.62	(34,460.64)
1984	544,234.43	26,678.50	570,912.93	82,285.71	220,868.02	115,781.25	418,934.99	151,977.94	615,295.32	902,964.72	(287,669.40)
1985	748,604.34	26,285.05	774,889.40	97,428.57	261,513.87	135,000.00	493,942.45	280,946.95	975,510.24	1,037,304.21	(61,793.97)
1986	818,990.23	33,589.06	852,579.29	113,142.86	303,693.53	159,843.75	576,680.14	275,899.16	809,088.43	969,543.77	(160,455.33)
1987	644,181.79	51,044.79	695,226.58	127,714.29	342,805.58	185,625.00	656,144.86	39,081.71	98,691.19	705,446.54	(606,755.34)
1988	463,548.59	62,187.27	525,735.87	146,571.43	393,421.17	209,531.25	749,523.84	(223,787.98)	(500,644.25)	493,181.49	(993,825.74)
1989	463,324.83	56,419.82	519,744.65	167,428.57	449,405.07	240,468.75	857,302.40	(337,557.74)	(658,007.30)	418,657.82	(1,076,665.12)
1990	613,300.87	47,872.18	661,173.04	193,142.86	518,426.33	274,687.50	986,256.69	(325,083.64)	(554,750.25)	449,338.38	(1,004,088.62)
1991	892,822.78	48,145.33	940,968.11	220,000.00	590,515.20	316,875.00	1,127,390.20	(186,422.09)	(275,772.32)	543,599.06	(819,371.37)
1992	677,389.64	50,010.29	727,399.93	241,428.57	648,032.91	360,937.50	1,250,398.99	(522,999.06)	(679,219.55)	373,935.98	(1,053,155.53)
1993	140,515.93	53,423.05	193,938.98	262,857.14	705,550.63	396,093.75	1,364,501.52	(1,170,562.54)	(1,385,281.11)	105,462.07	(1,490,743.18)
1994	(88,789.55)	97,414.43	8,624.88	285,714.29	175,822.92	431,250.00	892,787.21	(884,162.33)	(961,046.01)	42,271.28	(1,003,317.29)
1995	635,545.54	92,047.43	727,592.96				-	727,592.96	727,592.96	304,956.01	422,636.95
1996	802,484.50	88,884.82	891,369.32				-	891,369.32	829,952.81	338,314.09	491,638.72
1997	642,944.40	92,456.42	735,400.82				-	735,400.82	630,703.96	261,921.20	368,782.76
1998	944,960.40	81,350.21	1,026,310.62				-	1,026,310.62	825,273.90	328,869.15	496,404.75
1999	1,197,142.34	84,821.01	1,281,963.35				-	1,281,963.35	977,851.53	385,571.23	592,280.30
2000	1,292,180.00	85,759.00	1,377,939.00				-	1,377,939.00	984,242.14	386,407.14	597,835.00
											NPV = -3,115,971.84; B/C = 1.24; IRR = -14.40%

Initial investment cost was high, as infrastructure had to be developed. The project expanded during the early 1980s with loans in excess of R6 million being allocated annually. Benefits increased during the first few years of the project, but decreased significantly when the drought of the early 1980s took hold. Project cost rose progressively during the project's lifetime, as the loan capital not recovered impacted on the project. After 1994 when the project was terminated, no costs were engaged, resulting in more positive financial figures. However, a significant drop in participant number occurred since the early 1990s, as activities decreased.

Rainfall measured during the project's duration was similar to the long-term average of 500 mm/annum. Over the period an average area of roughly 6600 hectares was planted, with a mean yield of just over 2t/ha. The negative NPV of -R3.1 million; the benefit-cost ratio of 1.24; and the negative IRR of -14.40% illustrates that the project experienced financial difficulties, explaining its termination during 1994. Ironically this led to a significant improvement in farmer performance. Results are graphically illustrated in Figure 6.2.12. During the initial period of its chequered history the project was succeeding admirably, but after the drought of the early 1980s the project failed to deliver positive results when compared with a without-project scenario. A situation gradually developed where the majority was worse of than would have been the case without the project, especially as seen for the latter part of the project period.

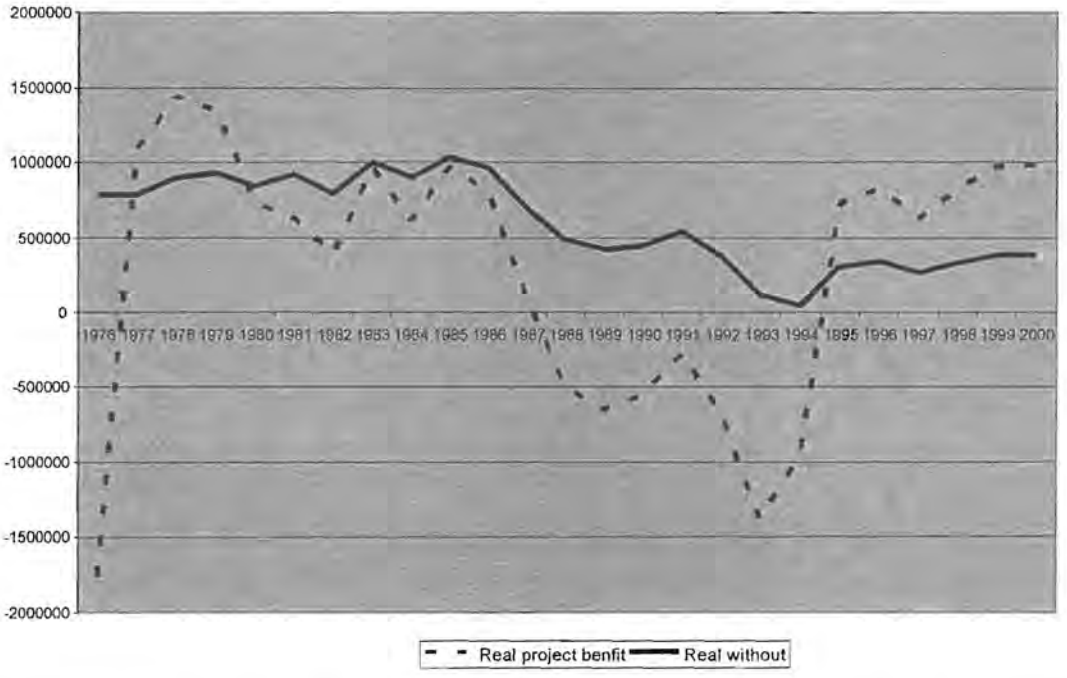


Figure 6.2.12: Financial project analysis (financial values – y-axis over time x-axis): Comparing with and without project scenarios at Sheila.

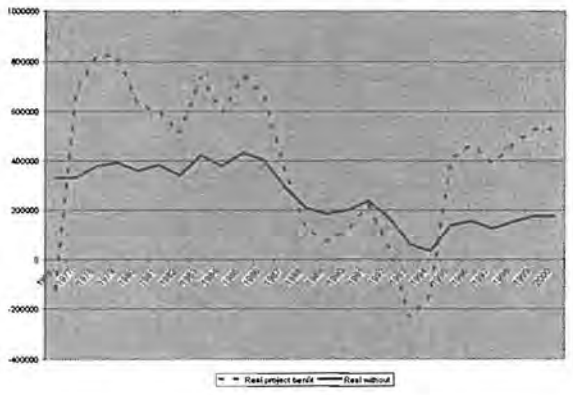
However, this does not provide the complete picture and an analysis of the various types of participants was subsequently done. Using data described in the farmer-level analysis, project benefits and costs were divided between the types in the typology, based on the respective farmer numbers, area planted and yields obtained. This resulted in four financial analyses, summarised in table 6.2.25.

Table 6.2.25: Financial analysis at the project level, for the farmer typology developed at Sheila:

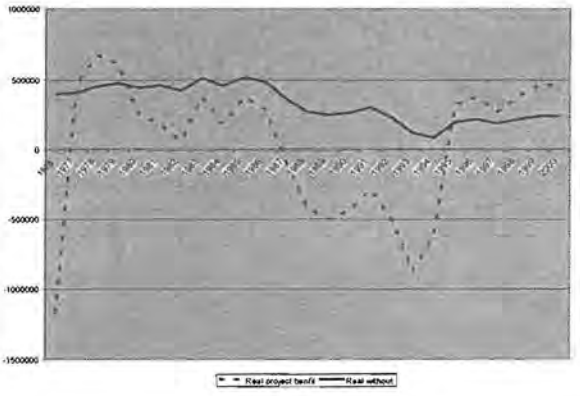
Farmer type	Internal rate of return	Net present value	Benefit-cost ratio
Inactive landowners	-9.9%	-177 376	0.44
Opportunists	n/a	-2 003 609	0.65
Entrepreneurs	-22.9%	-2 690 614	1.02
Commercialising	81.1%	1 216 983	1.41

The most obvious aspect from table 6.2.25 is that only the commercialising farmer type delivered positive IRR values. Even the entrepreneurs that took part in the project resulted in a slightly negative IRR value in terms of their contribution to the total project. In terms of NPV, again only the commercialising group had positive values. The cost-benefit ratios further illustrate the significant differences between the different groups, especially commercialising farmers and entrepreneurs when compared to opportunists and those inactive. The performance of the types of the Sheila typology is illuminated in Figure 6.2.13.

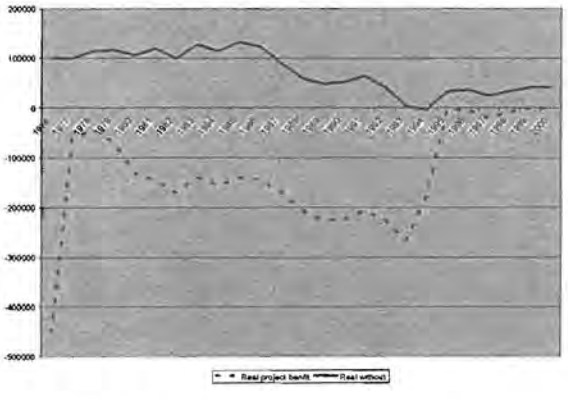
a) Commercialising farmers:



b) Entrepreneurs:



c) Opportunists:



d) Inactive landowners:

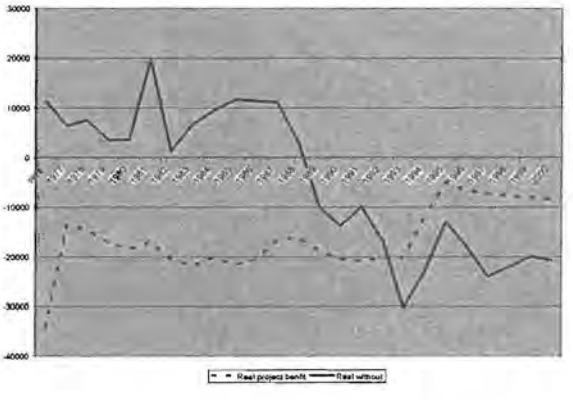


Figure 6.2.13: Financial project analysis (financial values – y-axis over time x-axis) on the basis of farmer types: Comparing with and without project scenarios at Sheila.

Participating commercialising farmers performed well, with negative values (real project benefits) obtained only during the last two years of the project, and generally still performing better than commercialising farmers not participating (without-project scenario). Participating entrepreneurs performed negatively from the late 1980s until the termination of the project, and for much of the period,

non-participating entrepreneurs (without project) performed better than their participating counterparts. Interestingly, participating opportunists at no stage outperformed non-participant opportunists. The result is that no IRR can be calculated for this group. These participants also never obtained positive financial values. Whilst participating inactive landowners only outperformed non-participating inactive landowners after project termination, these participants never obtained positive financial values (project benefits). In terms of recognising diversity, this financial project analysis again and convincingly, proves that the hypothesis stating that diversity must be described and dealt with.

6.2.4.5 Economic Impact: efficiency analysis

6.2.4.5.1 Shadow prices

To determine economic efficiency of resource use (valuing incentive, planning and management), benefits and costs are evaluated at prices that reflect the relative scarcity of in and outputs. This quantifies a project's contribution to the economy (Gittinger, 1982; Van Rooyen, et. al., 2002). There are valid reasons for accepting all labour and input prices at Sheila as such, i.e., as a true reflection of opportunity cost. Previous analysts also used this approach (Bembridge, et. al., 1982; Stilwell, 1985).

It is assumed that inputs were bought under competitive 'free' market conditions. Labour costs were also determined in a competitive market. The land involved was and remains to be state land. The value of land is related to the activity for which it is used, in this case, the without project scenario. As this is state land, it essentially does not have a market value. The opportunity cost of the land therefore is taken as the without project value.

Maize prices were shadow priced, as the market for maize was controlled at the time of the project, not reflecting true economic values. The world (fob) price (table 6.2.26) was used to obtain opportunity cost, thus calculating the real economic value of maize to the economy. From the traded price the transportation cost from the project to the point where the fob price is offered is subtracted, to obtain the shadow price of maize. The price information before 1982 was obtained from a previous analysis (Bembridge, et. al., 1982), while subsequent prices were obtained from the International Monetary Fund: primary commodity prices were sourced from [www.imf.org/external/np/res/commod/index.asp]:

Table 6.2.26: Maize; U.S. number 2 yellow, fob Gulf of Mexico: US Dollars per Metric Ton

Year	$ price	Year	$ price
1980	125.72	1988	106.95
1981	130.60	1989	111.37
1982	108.10	1990	109.28
1983	135.98	1991	107.47
1984	135.82	1992	104.21
1985	112.33	1993	102.04
1986	87.79	1994	107.78
1987	75.52		

Adjusting fob prices by transport charges between the farm gate and the point where the cif/fob price was quoted would result in 'real' or shadow prices. Stakeholders in the agricultural industry were contacted for information regarding import parity prices for maize. The NWC, SAGIS, Grain-SA and others were asked for information regarding costs concerning transport, insurance, port charges, taxes, storage, loading, fumigation etc., for the period 1980-1994, to accurately access shadow prices. However, no organisation could provide information for that period. An assumption was therefore made regarding these costs. According to the ARDRI analysis (Bembridge *et. al.*, 1982), marketing and transport costs varied between R25.00 and R34.75 for the first four years of the project, for an average cost of R27. From this, an average conversion factor of 0.96 was established. Locally determined maize prices are therefore adjusted by the conversion factor to determine shadow values for the project period.

6.2.4.5.2 Economic analysis at farmer level

The economic farmer level analysis (illustrated in table 6.2.27) does not vary extensively from the results obtained in the financial analysis. Profits are slightly lower or losses slightly higher. Considering that only the maize price, for the initial project period was shadow priced, this is to be expected.

Table 6.2.27: A summary of the economic analysis of participating farmer groups at the Sheila project.

With project for top, middle and bottom groups: – 1976-1980				
	Input costs/ha	Income/ha	Profit/loss/ha	Livestock profit
Participant bottom 1/3	179.66	159.43	-20.23	44.88
Participant middle 1/3	167.31	219.04	51.73	44.88
Participant top 1/3	171.47	279.39	107.92	44.88
Contractor bottom 1/3	253.73	236.54	-17.19	97.50
Contractor middle 1/3	239.73	286.79	47.06	97.50
Contractor top 1/3	234.66	381.31	146.65	97.50
Without project scenario for the Sheila typology – 2000				
	Input costs/ha	Income/ha	Profit/loss/ha	**Livestock profit**
Inactive landowners	600.00	404.86	-195.14	70.00
Opportunists	650.00	809.71	159.71	740.00
Entrepreneurs	850.00	1416.99	566.99	1400.00
Commercialising	1000.00	1619.42	619.42	1200.00
With project scenario for the Sheila typology – 2000				
	Input costs*	Income/ha	Profit/loss/ha	**Livestock profit**
Inactive landowners	600.00	0	-600.00	92.74
Opportunists	650.00	566.80	-83.20	722.07
Entrepreneurs	850.00	1214.57	364.57	525.18
Commercialising	1000.00	1862.33	862.33	2529.81

6.2.4.5.3 Economic analysis at project level

Economic project level analysis includes the corrections to include the shadow price of maize.

Table 6.2.28: Economic incremental net benefit, Benefit-Cost ratio, NPV and IRR, as determined for the Sheila project:

Year	Profit maize	Livestock profit	Total with project income	Running cost	Investment cost	Total cost	Project net benefit	Real project benefit	Real without	Incremental net benefit
1976	161,484.24	11,079.71	172,563.94	20,000.00	288,253.00	308,253.00	(135,689.06)	(1,443,500.59)	730,288.37	(2,173,788.96)
1977	185,520.73	10,292.30	195,813.04	24,304.76	23,913.68	48,218.44	147,594.60	1,405,662.84	732,247.73	673,415.12
1978	241,845.99	9,781.04	251,627.03	33,815.47	15,057.51	48,872.98	202,754.05	1,747,879.76	839,775.55	908,104.20
1979	280,503.46	11,330.59	291,834.05	42,548.72	34,217.50	76,766.22	215,067.83	1,641,739.17	861,639.77	780,099.40
1980	277,965.40	17,674.86	295,640.26	49,142.86	92,622.82	141,765.68	153,874.59	1,032,715.34	784,260.66	248,454.68
1981	340,190.09	27,121.22	367,311.30	56,285.71	151,079.86	207,365.58	159,945.73	929,917.02	858,968.82	70,948.20
1982	348,656.44	21,506.83	370,163.28	63,428.57	170,252.43	233,681.01	136,482.27	692,803.41	741,043.86	(48,240.45)
1983	518,154.14	19,841.73	537,995.88	70,571.43	189,425.01	259,996.43	277,999.44	1,252,249.73	935,936.68	316,313.06
1984	501,999.49	26,678.50	528,677.99	82,285.71	220,868.02	303,153.74	225,524.25	913,053.64	838,950.43	74,103.21
1985	694,516.15	26,285.05	720,801.20	97,428.57	261,513.87	358,942.45	361,858.76	1,256,454.02	966,995.04	289,458.98
1986	758,341.27	33,589.06	791,930.33	113,142.86	303,693.53	416,836.39	375,093.95	1,099,982.25	902,959.60	197,022.65
1987	589,254.43	51,044.79	640,299.22	127,714.29	342,805.58	470,519.86	169,779.35	428,735.74	653,519.27	(224,783.52)
1988	412,435.63	62,187.27	474,622.91	146,571.43	393,421.17	539,992.59	(65,369.69)	(146,240.92)	450,373.44	(596,614.35)
1989	405,599.61	56,419.82	462,019.43	167,428.57	449,405.07	616,833.65	(154,814.22)	(301,782.10)	376,531.82	(678,313.92)
1990	545,095.58	47,872.18	592,967.76	193,142.86	518,426.33	711,569.19	(118,601.43)	(202,391.52)	405,764.88	(608,156.40)
1991	807,952.38	48,145.33	856,097.71	220,000.00	590,515.20	810,515.20	45,582.51	67,429.75	496,597.58	(429,167.82)
1992	597,859.40	50,010.29	647,869.69	241,428.57	648,032.91	889,461.49	(241,591.80)	(313,755.58)	335,268.71	(649,024.28)
1993	77,578.33	53,423.05	131,001.38	262,857.14	705,550.63	968,407.77	(837,406.39)	(991,013.48)	77,578.04	(1,068,591.52)
1994	(146,768.43)	97,414.43	(49,354.00)	285,714.29	175,822.92	461,537.21	(510,891.21)	(555,316.53)	18,678.24	(573,994.77)
1995	543,242.78	92,047.43	635,290.21			-	635,290.21	635,290.21	270,400.55	364,889.65
1996	691,866.90	88,884.82	780,751.72			-	780,751.72	726,956.91	299,755.43	427,201.48
1997	529,746.36	92,456.42	622,202.78			-	622,202.78	533,621.60	225,576.40	308,045.20
1998	816,939.60	81,350.21	898,289.82			-	898,289.82	722,330.18	290,330.03	432,000.16
1999	1,053,148.74	84,821.01	1,137,969.75			-	1,137,969.75	868,016.59	344,452.23	523,564.36
2000	1,137,696.80	85,759.00	1,223,455.80			-	1,223,455.80	873,897.00	345,097.14	528,799.86
										IRR = -5.98%, NPV = -416,651.18, B/C = 1.18

As found with the financial analysis, positive economic values (project benefits) were obtained during the early 1980s, but these decreased during the drought of the early 1980s, although remaining positive until the late 1980s (also see figure 6.2.14). Negative values were obtained until the project was terminated, when positive values were again, ironically, obtained for those that previously took part in the project.

Whilst the trend is similar to that established in the financial analysis, net project values are somewhat higher. Whilst the financial NPV was -R3.1 million; the benefit-cost ratio 1.24; and the IRR -14.40% the economic NPV was roughly -417 000, the B/C ratio 1.18 and the IRR –6%. A group-based economic project analysis as with the financial analysis is not reported, but exactly the same trend is evident.

Although these results are slightly better than those obtained with the financial analysis, it still illuminates the economic problems that were generated by the project as a whole. Again, although at times the project showed very positive results and promise, it failed to deliver sustained positive results. Eventually the majority was worse off than would have been the case without the project.

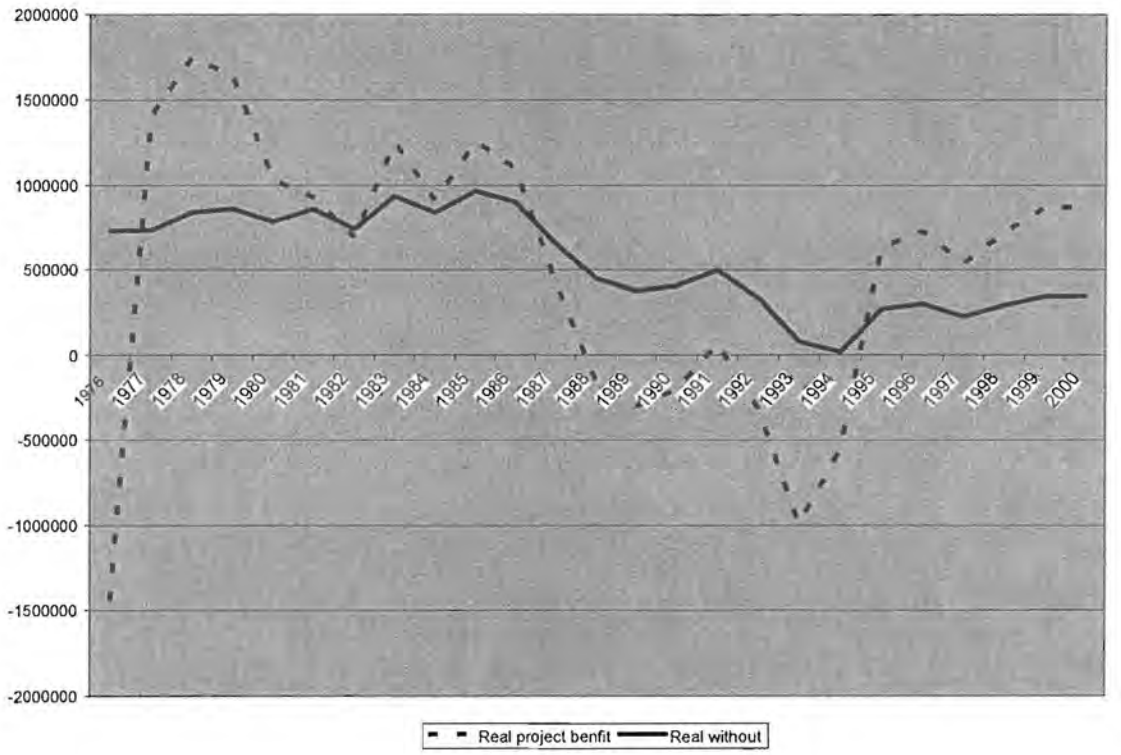


Figure 6.2.14: Economic project analysis (financial values – y-axis over time x-axis): Comparing with and without project scenarios at Sheila.

6.2.4.6 Conclusion:

Given the results of the financial and economic analysis, the one aspect that stands out is that project benefits did not exceed project costs. Therefore the essence of the analysis is that effectively the Sheila project did not entail a profitable investment, advantageous to the economy of Bophuthatswana or the region. The crux of analysis of the project is that the majority of farmers failed to produce positive net farm income, while the project as a whole also performed disappointedly. In essence, the project costs exceeded project benefits, rendering the project a failure in terms of the investment made.

Analysis indicated particularly large coefficients of variation for yield, gross income and total cost. This indicates widespread inequalities in income. Distributional (equity) issues were of major importance and negative perceptions resulted from the range of incomes achieved, despite uniform application of technology and management. This resulted from a lack of attention to economic diversity within the community. Because these differences were not specifically addressed, equity was not achieved.

Furthermore, the lack of skills transfer in terms of financial management resulted in large discrepancies between actual and perceived income. Most farmers were ignored to the economic realities of the crop farming enterprise. This constitutes a failure to reconcile technological and social realities.

A cynical view could be that empowerment and development was hampered by the political system of the time. Although it is partly true that a good project from bad policy is unlikely, the fact remains that the design criteria were not recognised at Sheila. Technical change was not reconciled with the social reality of most of the participants and diversity was not addressed. Whilst stakeholder linkages were facilitated, co-ordination between stakeholders was not optimal and communication was lacking. Especially in terms of skills development (HCD) and participation project management failed to perform.

Although not analysed, it can safely be assumed that the performance of the project would have been significantly enhanced if these aspects got the attention they deserved. The history of development described in chapter two supports the notion that sustainable development can be expected when participants are empowered to participate, where skills are sustainably transferred and where individuals benefit economically. Although the political change of the early nineties meant a severe decrease in direct and indirect subsidy of the project, these subsidies were in any case not sustainable. A more sustainable alternative during the time would have included a focus on Human Capital Development, in terms of both technical and financial management skills. In this manner the project would have been shifting responsibility to participants, whilst different options for the different farmer types would have bee identified and explored.

6.3 Indirect project impact

The true value of a project should be measured in terms of its contribution to the total economy (Van Rooyen, 1983). Indirect effects, particularly in the Sheila area could therefore provide a significant indication of project impact. These impacts include those stemming from (forward) and induced by (backward) linkages with other sectors in the economy, e.g. more activity in supplier and processor sectors. The direct contribution of agriculture to the economy of an area can often safely be doubled to determine the indirect contribution to that area, due to employment and production multipliers (Van Rooyen & Machete, 1991). These multipliers are the result of increased employment and income earnings due to linkages, i.e. forward and backward interactions between economic sectors. Indirect impact therefore includes employment creation and other spillovers, entailing quantifiable and non-quantifiable (intangible) effects such as changes in quality of life and attitude.

The way in which the Sheila project impacted on employment, spending, health and other tangible effects, as well as on intangible effects such as rural life, state of mind, confidence etc. is discussed in this section. Most of the information discussed is of a qualitative nature, originating from the qualitative part of the study, through engagement with farmers and other stakeholders in the area.

6.3.1 Spillovers and linkage impacts

Three major types of spillover can usually be identified, namely: economic spillover, technological spillover, and knowledge spillover (Anandajayasekeram *et. al.*, 1995). Economic spillover refers to the price effects from increased production. Within the regional context, this spillover affected regional production, consumption, trade and prices. Although not directly determined, key interviews revealed that profits generated through the project had a broad effect, both within and outside the direct project area. As the financial status of participants changed, a significant portion of profit was invested in the community, through expenditure. This took the form of especially improved housing and education. As illustrated in the description of the target population (6.2.2), housing and infrastructure in particular, is of a superior quality in the northern parts the Ditsobotla district, when compared with adjacent districts of the previous homeland.

A significant number of employment opportunities were also created due to the Sheila project. Apart from many direct job opportunities as employees, many less formal activities took place, especially around the cultivation process, i.e. weeding, harvesting, etc. Traders and businessmen in the area also expressed their satisfaction with the project, as they perceived a significant improvement in turnover or transactions (Bembridge, *et. al.*, 1982; Stilwell, 1985).

Technological spillover refers to the spillover of technology from one area to another. This has certainly happened through the Shiela project. Also in terms of knowledge spillovers; the methods used by farmers and market agents to cultivate, harvest, store, process, handle and transport crops, had wide applicability in the erstwhile Bophuthatswana. This also included the organisational models

and institutional strategies for project planning, training, etc. Many of these methods and procedures are today institutionalised in neighbouring areas and even further.

The project also induced changes in the availability of resources, contributing to efficiency. Through the co-operatives, farmers were exposed to a variety of products, especially agricultural inputs. Farmers from Sheila are more discerning and knowledgeable with regard to fertiliser types and cultivars than farmers in districts where projects were absent. Although financial constraints hampered the use of modern technology, the cultivation process introduced at Sheila spread to many areas, particularly in the Ditsobotla district.

Intangible benefits and costs, more difficult to quantify and allocate a money value to, were also encountered: these included benefits such as an improved quality of life and improved confidence. Although more recently the economic situation has deteriorated somewhat, due to the lack of production and economic hardship, the community is clearly still better off in terms of quality of life than most other wards and districts in the province. Previous analyses (Bembridge *et. al.*, 1982; Stilwell, 1985) also established that the project community had a significantly higher quality of life than neighbouring areas. This still holds true today and includes better overall health due to an improved self-sufficiency in food production and a related reduced infant mortality. Housing in the area is also significantly better than that found in other parts of the district, as well as in other districts. Also in terms of the water reticulation and electricity network, the Sheila area is better off, as also evident from the description of the target population.

The improvement in roads and transport (due to the fact that more people could afford vehicles) also increased mobility and led to exposure to other communities and people, which was limited before the project. This also increased the confidence of participants who felt that they had achieved something and could interact with other communities. The confidence level of farmers in the area is clearly higher than in other areas where this researcher worked. Confidence did not only originate from the exposure to technology and the ability to utilise this, but also from the exposure to the administrative processes and the opportunities for public expression through the local farmers' forums. It can also be attributed to the exposure these farmers had to training and interaction with other stakeholders.

For the most part, better nutrition had a positive impact on the health situation, but the fact that the housing and water distribution network were significantly improved, also contributed to this positive impact. The increased self-sufficiency in terms of food production not only contributed to increased confidence and health, but also to more purchasing power and better overall living standards. Although HCD was neglected, the attitude towards the project and its influence on rural life was generally very favourable.

All indirect impacts were not positive. Some participants and non-participants perceived that substance abuse (particularly alcohol) increased as a result of the accruement in disposable money. Some of the elderly people and traditional leaders further perceived that the youth in particular was prone to be less respectful to their elders, while crime was also perceived to have increased. In

particular it was perceived that theft of both crop and livestock products became a more frequent phenomenon.

Another impact that can be viewed as negative, especially by some of the farmers, is that livestock numbers have decreased significantly, mainly due to the fact that less area became available for grazing. However, this enterprise has repeatedly been proven not to have a significant economic benefit.

As described in previous sections, the input suppliers and output buyers definitely benefited from the increased production. While many farmers often did not make a profit, these stakeholders gained significantly throughout the project life.

Non-participants, including teachers and traditional leaders, etc., were in general also positive about the project. Various traders perceived that the additional income in the area increased their turnover. Most non-participants viewed the project as progressive, with various favourable spin-offs such as increased economic activity, more trade, better transport, etc. To some extent, the perception is that people in the area feel that the project exposed the community to the outside world and 'put them on the map'. A particular benefit mentioned by this group was that the project brought significant knowledge and skill to the area.

The local traditional leadership was in general also positive. Some traditional leaders and teachers in the area were also landowners and therefore participants in the project. Recent discussions with farmer groups also illustrated this, as headmen were vocal in their support of efforts to revive the project. Although they obviously felt particularly strongly about protecting the land tenure status quo, the project "teaches our people how to use resources". For the most part traditional leaders did not feel threatened by the project, probably because the land tenure system used is at least partly recognising their role, although they stated that the perceived increase in crime was a worry to them.

It is clear that despite the extensive criticism that these studies levelled at the project, significant indirect impacts, mostly positive, were encountered. However, if the design criteria developed during this study could have been applied, these indirect effects would probably have been more significant.

6.3.2 Environmental impact assessment

Several types of environmental impacts could potentially be distinguished: the first being on-site market impacts. These impacts affect only on site, do not have downstream effects and can be evaluated using conventional markets. To evaluate this environmental impact, a description of the Sheila area is appropriate. The area is relatively flat with no mountains or hills. No permanent surface water is evident but underground water resources are extensive and reliable. Winds are predominantly north-westerly. Average annual rainfall varies between 500 and 600 mm. The area predominantly has deep, red plinthic catena soils, suitable for crop production. These pedal soils are sandy loams of the forms Avalon, Bainsvlei, Clovelly, Glencoe, and Hutton- ideal for crop production.

A relevant example of on-site environmental market impact would be soil degradation, entailing the loss of nutrients when farming systems do not adequately replenish the nutrients used. These effects are specific to the site affected and affect soil productivity. These impacts are reflected in yield losses and can be valued using the market prices for the relevant crops. This impact is evident at Sheila: the generally low nutritional status of the Sheila soils is of concern, as it affects yield and therefore profit. However, farmers have for most of the project's life, fertilised sparingly. This of course neutralised any negative impact from long-term over-fertilisation. Soil surveys do not indicate any undue high levels of minerals, and the opposite is in fact true. The soil status is relatively poor with very low levels of the main elements; nitrogen and phosphorus. In terms of phosphorus the soil status in the area is ± 6.4mg/kg in comparison with 25.5mg/kg in the neighbouring, commercial Lichtenburg area (personal communication: L Letshwiti; Soil Scientist, TSS, NWDACE). This has a negative impact on production and on soil microbes. Soil structure would in the long term also be affected. Most scientists do however perceive the process to be reversible. But the low nutritional status has definitely impacted negatively on the production potential of the land. Given the financial status of most farmers, as well as the fact that the tenure system does not encourage sharecroppers to invest in land to which they only have temporary access, the problem was exacerbated.

The soil-pH or acidity as measured in soil surveys is generally acceptable as most of these soils have a lime-presence in the underground. As soil-acidity could become a problem with long-term high fertiliser rates, this is again not a concern at Sheila.

In general, soil erosion at the project area is negligible, mainly because of the topography, the stable soil structure and the absorbing soil texture, which limits significant water erosion. However, as the majority of soils have a low clay percentage, they are to some extent subject to wind erosion. During the spring strong north-westerly winds are often evident in the area. Some wind erosion occasionally takes place where lands are ploughed early in spring. Given the fact that optimal planting occurs late in November and often takes place later, wind erosion was not a significant problem. Farmers most often prepared their lands after the strongest winds had decreased somewhat.

No other significant environmental impact is evident at the Sheila site. One could argue that some loss of biodiversity was experienced due to land cultivation, but given the potential of the land and the need for it to support the local communities; this is a trade-off that had to be made. With regard to off-site effects, concerning individuals and communities downstream from where the project took place, no significant impact can be distinguished. No downstream silting up of reservoirs or rivers or a reduction in water storage capacity is evident. In the same vein, no significant atmospheric or other pollution resulted from the agricultural activity.

6.4 Application of the systemic impact analysis framework

The chapter concludes with a systemic impact assessment of the project as described in this section. It uses the decision rules developed by the DBSA as basis for analysis and deals with questions regarding institutional, effectiveness, financial and economic, social and indirect impacts. As described in Chapter 4.5 this framework accommodates important operational and political considerations. It focuses on common ground between stakeholders, financing, financial and economic viability. There are similarities with the design criteria developed during this study, as discussed in chapter two. The framework guides project analysis through a sequence of questions designed to raise issues in a logical manner. The first eight questions deal with more robust macro issues while the last three questions deal with specific project appraisal in somewhat more detail:

(i) Question 1 asks if there was a 'fit' between the objectives of the major participants. There is no record of disagreement between the major parties; the participants, the public service of Bophuthatswana, NWC and later Agricor. However, it was established that the objectives of the participating farmers were not addressed. Especially in terms of divergent objectives for different types of farmers, no alternatives were provided. As described in section 6.2.1.4, participants who had serious questions regarding project management, were overruled by the farmer's committee, consisting of their peers. Although farmers were in favour of the project, the mechanisms used were not always well received. The implementation process was not transparent and participants were not engaged in decision making. Committee members did not express concerns, but also had no real decision-making powers. Farmers in general, perceived the project as paternalistic, but did not complain openly, as they perceived this as potentially detrimental to the future of the support the project offered. Clearly communication regarding the objectives of the different stakeholders was not optimal. Whilst NWC was running the project, this was done relatively independently, with little interaction with other stakeholders. The perception formed from key-interviews and the literature (Bembridge, *et. al.*, 1982; Stilwell, 1985; Francis, 1999) was that although intentions were mostly honourable, the NWC and Agricor could be perceived as too focused on target sales, while the politicians only focused on showing the independence of Bophuthatswana as a net food producer. It can be argued that the objectives of the service provider were the priority. In the process farmers and eventually project sustainability suffered.

(ii) Question 2 deals with a policy 'fit'; Was the project in concurrence with the national policies of the time? The answer to this question would be yes. Bophuthatswana, through its executive powers took interest in the project, while the government of the RSA was also interested in the success of the endeavour. The project's main aim from the perspective of the politicians was to obtain self-sufficiency in food production for Bophuthatswana. One can however argue that the agricultural policies of the time, although much less focused on empowering communities and individuals, also had as aim the creation of an independent farmers' class. This 'fit' did in practise not materialise. However the project did fit the stakeholders' interpretation of policy and in terms of operational issues no major differences were experienced.

(iii) Question 3 deals with a programme 'fit'. The project did fit the development programmes of the time to a large extent, as capital-intensive, centrally managed projects were popular in most developing countries during the late seventies. The project was one of the first to take place in Bophuthatswana, but projects in neighbouring countries influenced the development programmes of the region. The concept was acceptable to all stakeholders, initially promoting linkages and co-operation. Although there is no official record of the project forming part of a broader, integrated rural development programme, there is evidence of broader planning and implementation. Infrastructure was developed while school and clinics were built in the area. However, no HCD programme was developed or implemented and no diversified approach to cater for different farmer types was ever implemented.

(iv) Question 4 asks if there was evidence of market or government failure, as a project should intervene in the economy where such failures exist. As input and output market prices in the maize industry were regulated, market failure was evident. With regard to government failure the answer again has to be yes. The results from the economic analysis and the subsequent extensive transformation of specifically agricultural policy indicate that the policies and support systems of the time were inherently seriously flawed. In attempting to rectify market and government failures, the project could be interpreted as addressing these issues: During the 1970s and 1980s the agricultural market was inaccessible to the small-scale farmers of the Sheila area, due to the political (policy) system as well as market regulations. The project facilitated access to resources and services and provided opportunities to commercially-inclined farmers. As diversity was not recognised, opportunities for the small-scale sector in general were created, but in an inefficient manner.

(v) Question 5 deals with the appropriate institution to finance the project. The NWC as well as Agribank financed the Sheila project. Agribank was a parastatal, affiliated to the Bophuthatswana Department of Agriculture. Guarantees for these funds were provided by Bophuthatswana Government. While there could be no objection to a private institution financing a project, the fact that NWC provided finance as well as input and output markets, might constitute a conflict of interest. However, whilst NWC had a clear profit-motive, Agribank was perceived by former project managers and the public, as being too liberal in its funding policy. The fact that farmers could apply for loans on an annual basis, often whilst defaulting on previous loans, contributed to the large debts incurred. It could also be argued that NWC was not strict enough in its financing policy, as they were assured of making a profit through the rigid input supply policy and assured output markets, as well as the guarantees provided. By the same token Agribank was not averse to supplying loans, even to high-risk farmers, as these loans were guaranteed by the state. Furthermore, the fact that there was extensive political pressure for the project to succeed, apparently contributed to the situation where credit was relatively cheap. The ease with which debt was repeatedly written off, illustrates a lack of fiscal discipline. Whilst the public sector could in principle fund initial operational/recurrent development costs, e.g. salaries, etc., these costs should eventually have been covered by the project. In any event, partnerships with finance institutions (Agribank) and the private sector (NWC) should have been addressed with more

circumspection. The levels of cost recovery from beneficiaries were not appropriate and did not contribute to install the principles of sound financial management in farmers. The level of credit-subsidisation did not prepare farmers for a free market scenario. This contributed to the current situation where most of the farmers with real farming skills are struggling with debt.

(vi) Question 6 appropriately asks who "owned" the project. From the evidence presented, only 6-10% of landowners were involved in the project at any stage, mostly as employees. It must therefore be concluded that farmers did not take full ownership of the project at any stage. The project was initiated after limited consultation with farmers. Although farmers were generally in favour of the project, they perceived it as paternalistically driven. Participation was minimal, with only a small group of progressive farmers being active. The project management team, together with paid employees, mostly farmed on behalf of the beneficiaries. This was supported by the target group, as most landowners were actually not farmers, satisfied with receiving the benefits. However, the lack of empowerment and lack of ownership taken is evident in the lack of agricultural activity and skill in the area today.

(vii) Question 7 deals with the distribution of benefits and costs: it is clear that although all stakeholders incurred costs, the North West Co-operative was more than adequately reimbursed through its profitable facilitation of input and output markets. The public institutions involved also incurred costs, and the record shows that significant amounts were never recovered. Although it could be argued that the benefit did go to the farming community, as part of broader society, this was done inefficiently, with significant cost to the taxpayer. Equity was not achieved. As established with this study and preceding studies, diversity within the community is extensive, leading to different levels of success. More entrepreneurial farmers benefited significantly, while less equipped farmers were not catered for and eventually did not succeed. This strongly suggests that a multi-faceted approach, based on diversity within the agricultural community, should be investigated. This failure to deal with diversity led to most of the direct benefits not being sustainable, as many landowners are today in a similar position as before the project was initiated. Although secondary players such as the NWC should also have gained, it is the target group that should predominantly have received benefits. This was not the case.

(viii) Question 8 deals with financial affordability. According to this study, the project was initially financially affordable. Especially during the first five years, financial cost-benefit ratios of higher than 1.4 were achieved. Budgetary provisions were in place and project participants, borrowers, and the state were in a position to sustain the operation and maintenance of the project. However, the project was eventually terminated during 1994 as a result of financial difficulties. Investigations into allegations of corruption and mismanagement have been conducted but the outcome of these is not publicly known.

(ix) Question 9 deals with economic efficiency. According to the result of this study, the project was not economically viable and economic benefits did not exceed economic costs. Whilst a variety of reasons could be forward for this situation, as described in section 6.2.4.6, a main

constraint was the lack of participation and ownership of the beneficiaries. This again can be attributed to the fact that the objectives of the farmers were not recognised and diversity within their group not dealt with. The lack of sound linkages between the stakeholders also resulted in a lack of control, which negatively affected financial discipline, both from the farmers, and the supporting organisations, especially NWC and Agricor. The political system and the lack of an effective empowerment policy also had an impact on the lack of sustained efficiency.

(x) Question 10 deals with general sustainability of project benefits. The project has to be evaluated in terms of financial, technical, institutional, environmental, social and political sustainability. Fair benefit distribution is required to ensure that equity considerations are met and that the project is sustained through participation. It is here where the project failed to a large extent. Financial benefits were reasonable, especially during the initial part of the project. However, the project particularly failed in terms of economic sustainability, due in a significant degree to lack of attention to diversity. Environmentally, the project was sustainable as no significant negative impacts were encountered. In terms of social sustainability, the project again failed. Diversity was not recognised and technical innovations did not recognise social reality. The fact that the mechanisation services were not maintained, and that a very limited capacity for this exists in the community, is a case in point. While a high input technical approach was used, this is no longer practised. As the political environment has altered significantly, the point of political sustainability is actually moot. Clearly the political foundations of the era were not sustainable. Adaptations focused on participation, HCD and transparent processes have also not been institutionalised.

(xi) Question 11 asks if the project was the "best" alternative in terms of the set objectives. Although it is difficult to evaluate that 26 years after initiation, the project proposal and the philosophy behind it, which actually aimed at empowerment and participation, cannot be faulted. The project was potentially a solution to the identified problems, although implementation of the project was certainly sub-optimal. Especially in terms of the project design criteria identified through this study, more focus on participation, recognition of different farmer types and appropriate technologies was needed. However, the political pressures, as well as the diversion towards target yields and a neglect of HCD, caused a shift away from the initial aim of the project. If the project was implemented as planned, and if the design criteria were recognised, the result might have been different.

According to this evaluation, the project had potential to support the establishment of independent farmers, to focus support and to provide access to services and inputs. The philosophy and objectives were sound, whilst the institutions involved were also well suited for the project. However, implementation was not effective, especially in terms of establishing ownership and real participation. With regard to the design criteria, linkages were mostly ineffective with limited communication and empowerment. Economic diversity was also not addressed, as no differentiation was made in support measures for the various farmer types present in the area. However, given the potential of the approach to focus support and access to services and inputs, it is crucial that the lessons of the past, as distilled into the design criteria, are implemented in future ventures of this nature.

6.5 Conclusions

This study constituted the third extensive impact assessment of the Sheila project. The project gripped the attention of many involved in development (Seobi, 1980; Bembridge et. al., 1982; Rood, 1983; Stilwell, 1985; Cuthbert, 1993; Stacey *et. al.*, 1994; Francis, 1998 & 1999). All these investigations established that the project had potential, but most concluded that farmer capacity needed to be developed further. This study was initiated during 1997 and entailed a combination of quantitative and quantitative procedures, also constituting an analysis of the policies in South Africa and Bophuthatswana before democratisation. Statistical analysis entailed various phases, focused eventually on a typology for the Sheila ward.

The project commenced during 1976/77 with a contractor system and as objectives improved utilisation of land, selection and training of farmers and increased production. Lands were cultivated as a unit while cost division and profits were calculated in the extension office. The NWC, in collaboration with the Bophuthatswana government, was profitably involved as input provider and market agent. Training was sporadic and insufficient. Local drive, management and initiative, were mostly missing. Effectively, from the inception of the projects, the majority of land right holders ceased to farm. The project expanded until ± 26 000 ha were utilised, constituting 23% of Bophuthatswana's maize needs. Farmers were satisfied with the project. Perceived advantages included the availability of mechanisation, credit and management 'doing everything'. Holdings size, yields and profits increased significantly, resulting in a higher quality of life.

The capital-intensive project was a short-term activity in order to facilitate food self-sufficiency to be subsequently complemented by longer-term capacity building, but this did not materialise. Although participation and HCD were striven for in theory, this did not feature in practice. Diversity in the community, sustainability and social realities were also not recognised at the time. Insufficient linkage and communication between stakeholders was evident. When the desired results were not achieved, pressure increased, as illustrated by an Agricor proposal for estate type farming. Implementation effectiveness was determined through a logical framework analysis and concluded that although production had definitely improved under project management, very little empowerment of farmers was actively attempted. While top farmers did well and non-participants were positively influenced through spin-offs, the majority lagged behind due to a lack of commitment and training.

In financial and economic terms, the first five years of the project were successful as illustrated by benefit cost ratios of roughly 1.35. Average profits were impressive. However, large variation in yield and profit occurred. Subsequent analysis established that profit margins for the project as a whole decreased, while the differences between farmers remained pronounced. The major objective: to develop arable potential and increase self-sufficiency was achieved temporarily, for a selection of participants and at extensive public cost. Pareto optimality was not achieved.

Despite valid criticism the project had significant positive spillover and linkage effects. More activity in supplier and processor sectors resulted while profits generated had effects both within and outside the direct project area. A significant number of employment opportunities were created. Procedures and

technologies used also had wider applicability and induced changes in the organisational and management systems in the agricultural support services. Other intangible benefits included an improved quality of life and improved confidence.

The project was unable to establish a range of farmers, and instead, left many in debt and enhanced class differences: farmers are today in a similar situation as before the project, after 18 years of project support and eight years as independent farmers. Sharecropping still is the major form of agriculture, but a significant drop in agricultural activity is evident since the early 1990s. Average yields decreased from over 2tons/hectare during the project to 1.7ton/ha. This study has, as have previous evaluations, found large variation in yields and profits. The probable reason was managerial input and aptitude that differed, highlighting economic diversity in the community. Existing diversity was quantified in a typology with four farmer types, facilitating the identification of constraints within homogeneous groups and therefore focused support. Serving farmers according to type will enhance clarity of client profile; facilitate appropriate strategy per type and eventually enhance development.

The DRSA framework captures the essence of the impact: objectives of participating farmers were not always properly addressed, impacting negatively on the sustainability of the project. Given the policies of the time, there was a policy fit, although no empowerment policy existed in the previous dispensation. The project did fit the programmes of the time. Although no IRD programme was officially established, infrastructural adaptation complemented the project. Market and government failure was evident and the project was warranted as an attempt to rectify this. The level of debt write-off as well as financing through NWC (as input provider) was inappropriate and contributed to a situation where most farmers with farming skills are today suffering with debt. The largest failure of the project was that farmers never accepted ownership or responsibility. No pareto optimality was achieved as the cooperative benefited more than the farmers, while benefits received by farmers also varied extensively. Although both financial and economic performance was initially positive, high levels of variation between farmers were always a concern. Given the current situation where farmers are in general ill equipped to farm, the project was obviously not sustainable. Equity considerations were not met and sustained through participation. Although it is difficult to evaluate after 26 years, the initial project proposal, which dealt with empowerment and participation, cannot be faulted. The project was potentially the optimal solution to the identified set of problems and objectives.