

**COMMERCIALISING ARABLE FARMING IN RUST DE WINTER:
THE ARD APPROACH**

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Abstract:

The objective of this paper is to identify possible strategies to improve the livelihoods of the farmers of Rust de Winter in the Waterberg District of Limpopo Province. The farm consists of great diversity in agricultural potential, due to different soil types, access to water and grazing capacity. There are currently very little agricultural activities, or success thereof, due to various problems and lack of opportunities. The Agricultural Research for Development (ARD) approach, which is a collective rural innovation approach, was applied by an inter-institutional, interdisciplinary team, to identify opportunities for commercialisation of arable farming and accordingly improve the livelihoods of the Rust de Winter farmers. The ARD approach is a holistic, multi-stakeholder approach that is development oriented. An ARD procedure, as developed by the International Centre for development oriented Research in Agriculture (ICRA), was followed in this study. Different development strategies, to address the problem of commercialising arable production, were identified, screened and prioritized through participatory stakeholder workshops to verify their validity, feasibility and practicality. A few recommendations are made toward the creation of an enabling environment for development and the implementation of strategies.

1 Introduction

The complex problem of commercialising arable farming in Rust de Winter was identified by the Limpopo Provincial Department of Agriculture (LPDA), together with the Agricultural Research Council (ARC), as beyond the reach of one discipline and / or institution. An inter-institutional, interdisciplinary team applied the principles of the Agricultural Research for Development (ARD) approach to this study, in identifying opportunities for commercial agricultural production for Rust de Winter farms, in recognition of limited irrigation water.

Agricultural Research for Development (ARD) is a research approach, which is development oriented. The International Centre for development oriented Research in Agricultural (ICRA) defined ARD as a process for planning research and development activities. Through a general procedure for ARD, it is possible to produce a range of technological, policy and organisational options that meet wider economic, social and environmental objectives. ARD is a problem solving approach, and appropriate to apply to a complex problem, such as the commercialisation of arable farming of the Rust de Winter farms.

This study provides an independent, objective overview of the situation, to provide a realistic assessment of the area's farming potential. In achieving this, a current livelihoods system analyses was conducted, whereby the initial farm typology was identified for better targeting of future development efforts. Past and expected changes are recognised, especially in relation to the decrease in availability of irrigation water and the effects of land tenure and land claims. Development strategies are identified, screened and prioritised to achieve the purpose of commercialising arable farming and thereby reaching the goal of improved livelihoods for the Rust de Winter farm households.

2 Problem statement

The study forms part of an initiative to develop a stable agricultural environment for farmers on the Rust de Winter farm, to ensure that they are financially successful. There is also a need for guidelines on how to revitalise the farm and as such have people making efficient use of the land, instead of just occupying the land without any production activities taking place. The central research question was: "*What opportunities are there for commercial agricultural production on Rust de Winter, in recognition of the limited irrigation potential?*" The study focuses on arable farming in the area, looking at opportunities for commercial crop production.

2.1 Background of the study area

The Waterberg district municipality, falls under the Limpopo province. The district is rural in nature with the urban areas mostly described as dispersed and fragmented (De Klerk, 2003). The farm area consist of 38 000 ha, with 12 000 ha falling under the Limpopo Province and 26 000 ha under Gauteng Province.

The climate in Rust de Winter is hot and dry with an average annual rainfall of 600mm, with a relatively high evaporation rate. Rainfall is predominantly in summer with an estimated average range of 20.8 to 123.3mm between September and April, and 3.7 to 7.8mm between May and August. The area is characterised by dry and wet cycles, but a very dry year can be expected at least once every 10 years (LPDA, 2004).

The history of the Rust de Winter Farms dates back to the 'Voortrekker days' in the 1800's. The first white farmers discovered and utilized the natural pastures for their excellent winter grazing potential, hence the name Rust de Winter. The Rust de Winter irrigation scheme was developed in the 1950's to promote commercial arable production. The Rust de Winter dam's capacity was utilised mainly for agricultural purposes (DWAF, 2005). In 1981, the farms were bought out by the government, due to increased diverse water demand. The Suidelike Transvaal Kooperasie (STK) was appointed to maintain the farms, until its withdrawal in 1992, due to political pressure and economically unfeasibility. Thereafter, illegal land invasions took place. In 1992 the Renosterkop Dam was constructed lower down stream on the Elands River, following increasing water demand for household consumption in the newly constructed urban settlements, which formed part of the former KwaNdebele homeland. In 1994, after the first democratic elections, and the reintegration of KwaNdebele into South Africa, the Rust de Winter farms became state owned land. Land occupation was then legalised, through allocation of lease agreements.

2.2 Context of the development problem

In 1994, the Rust de Winter farm was officially demarcated into two farms - one for the Gauteng Province and the other for the Limpopo Province. Before the demarcation, the Gauteng Provincial Department of Agriculture provided extension services and guidance to all the Rust de Winter farms. But after the demarcation, each province became responsible to offer services to its

farmers. This resulted into a lack of communication among service providers and a power play over management and administration over the farmers, the farms and the available resources.

The farmers currently lease the land from the Department of Land Affairs at a rate of R8.00 per hectare per annum. The Land Redistribution for Agricultural Development (LRAD) programme recently gave the farmers the option to apply for ownership of their leased land (DLA, 1998). The applications are in the processing phase, but the farmers' tenancy on the land and their application to ownership thereof is of an insecure nature, as the land in question is being claimed by two different tribes, through the Land Reform programme. The future of the Rust de Winter farmers is at the mercy of the Department of Land Affairs through its policy (FWR, 2003).

Some farmers are financially sustainable due to other off-farm income opportunities, which contributes substantially to their household income. The farmers, solely involved in farming, depend on loans for production credit and partnerships with commercial farmers, to be able to generate income.

Production capital is absolutely essential for any farming operation. Because Small-scale farmers do not have collateral, they find it difficult to acquire credit. The commercial banks and Land Bank consider small-scale emerging farmers as too risky (Van Schalkwyk and Botha, 2003). According to Land Bank (2005), an amount of up to R25 000 is borrowed to farmers without collateral. This amount is insufficient for feasible production and most of these farmers, able to get funds, do not have the necessary financial management skills, which, together with low profits, influence their repayment ability.

Due to highly erratic rainfall patterns in the Waterberg district, dryland production is very risky. Farmers are dependent on irrigation water for feasible arable production. The most consistent and reliable water source is that from the Rust de Winter Dam. According to DWAF (2005), the Rust de Winter Dam has a total capacity of 26 million m³, of which 1.5 million m³ can be distributed for agricultural purposes. The rest is utilised for household and industrial purposes. Before 1981, enough irrigation water was made available for feasible arable production on 3000ha (Robinson, 2005). Due to the diverted demand for the water since then, the allocation of water for

agricultural purposes, were decreased to serve feasible arable production on 165ha. The DWAF indicated that the farmers do not have the power to claim more water because they do not have a license for water rights. Farmer needs ownership of the land to acquire water rights.

According to the local farmers at Rust de Winter, those farmers in partnership with white commercial farmers are more capable of effective farm management and decision making. The full-time guidance, technical advices, risk management and financial management advice offer them confidence in pursuing farming compared to other farmers. Most farmers do not have access to such partnerships, and therefore lack the advantages of having farm management and marketing skills.

3 Methodology: The ARD approach

The ARD approach is a holistic, multi-stakeholder approach that is development oriented. This implies that it is *problem centred* and *context based*. It analyses the developmental problems and opportunities of farmers, rural communities, societies and environments to work with those complex problems which are perceived to be of priority. Development is a highly complex, inter-related process, therefore, in order to have a developmental impact; research has to look at problems in their broader context. It implies an interdisciplinary approach to solve problems, so that their different ramification may be covered from different disciplinary perspectives (Mettrick, 1993). This collective rural innovation system was applied by an inter-institutional, interdisciplinary team to identify opportunities to commercialise arable farming operations and accordingly improve the livelihoods of the farmers.

The ARD approach, which promotes development oriented research, could be defined as a collective innovation system, which provides a synergy of various other approaches. Research and development activities, resulting from ARD, respond to the needs of clients and beneficiaries. It contributes to wider development objectives including poverty reduction, sustainable resource use, food security and competitiveness of farming enterprises. By achieving this it involves the participation of clients, beneficiaries and other stakeholders to identify and evaluate innovations within broader agricultural knowledge and information systems. The

systems perspective is crucial to integrate the different perspectives in a holistic process of improving technology, policy, markets and social organisation for the betterment of agricultural development. It also requires interdisciplinary and inter-institutional teamwork to combine the strengths and perspectives of different scientific disciplines and different institutions to respond to the multifaceted objectives of development.

ICRA has designed a **general procedure for ARD**, based on the principles outlined, which is able to produce a range of technological, social and environmental objectives in solving a variety of complex problems. The ARD procedure is a flexible, pragmatic sequence of activities that guide interdisciplinary and inter-institutional teams from contextualising a complex problem to constructing concrete action plans to address this problem via the steps of systems analysis and joint planning with the stakeholders involved.

The first phase of the procedure is organising the team and accordingly clarify objectives and define expected outputs and work plan. The perspectives of these stakeholders are incorporated with the team's analysis to contextualise the problem in the wider development context. It makes it possible to identify and define those elements of this system that need to change in order to address the problem. The relevant sub-system, formed from these elements, is then further analysed, again with stakeholders, to identify potential opportunities and strategies to realise them. Analyses thereof are done through an agro-ecological, social and economic perspective.

These analyses results in a definition of alternative future scenarios according to the relevant driving forces influencing the system. The team discusses alternative scenarios and risks of various strategies with the different target groups of beneficiaries and other stakeholders. Together they negotiate the choice of a realistic combination of strategies that are mutually beneficial to all the stakeholders and define the research and activities that needs to be done to realise these strategies. This leads to a list of research activities that is then prioritised and formulated into joint action plans. Figure 1 below, provides a schematic presentation of the ARD procedure.

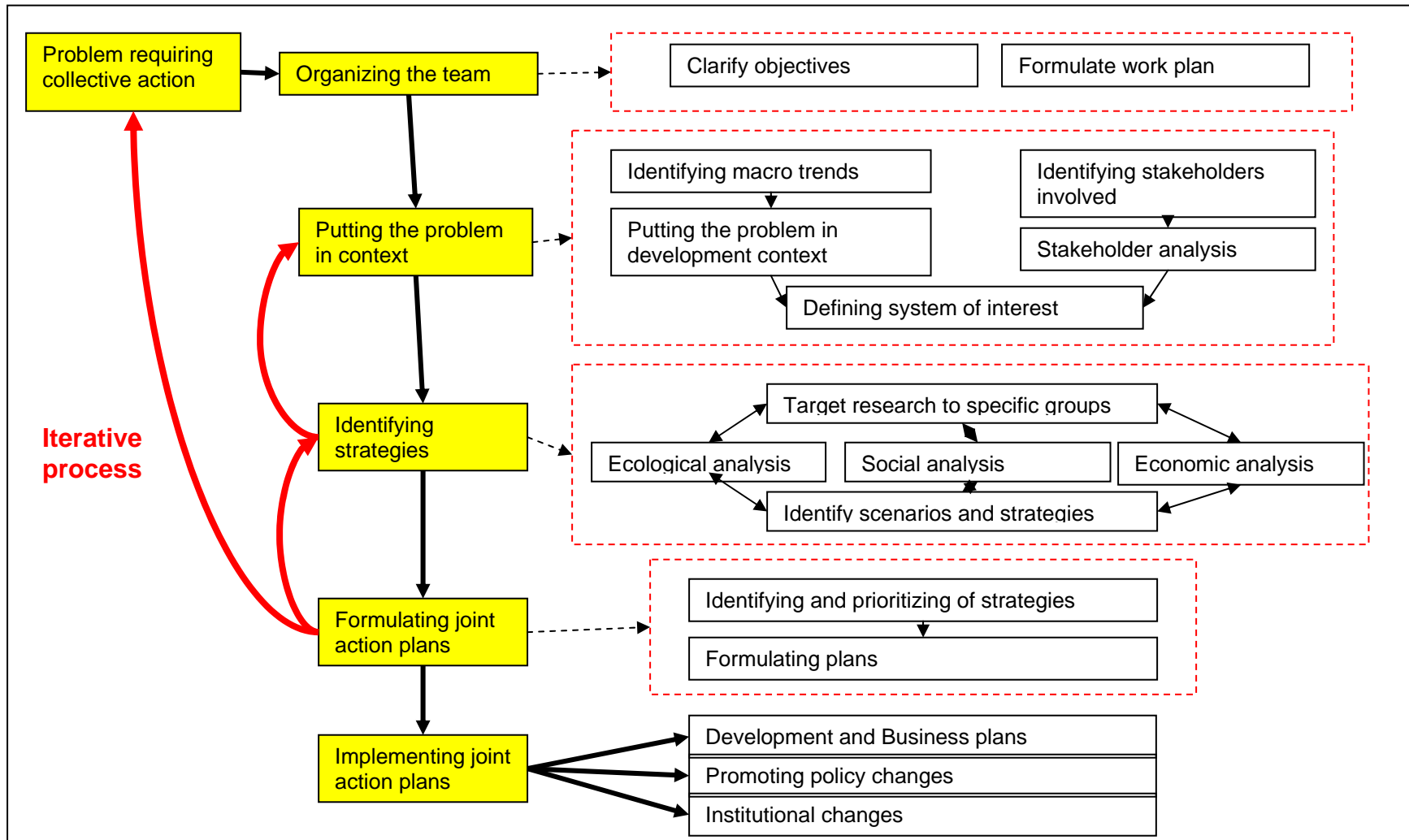


Figure 1: Schematic presentation of the ARD procedure

4 Results of the ARD approach

4.1 Socio-economic status of the Rust de Winter livelihoods

‘Livelihood’ refers to ‘means of living’ or ‘the way people make a living’. Analyzing livelihood systems, in this case, is the analysis of how farmers in Rust de Winter make a living. In a broad context, the sustainability of livelihoods on the Rust de Winter Farms is determined and driven through a number of elements/factors.

The **macro influences** on the sustainability of livelihoods on the Rust de Winter farms can be explained in a very broad context, but in this framework it is narrowed down to access to and availability of markets (considering market outlets and competition thereof), policy implications (affecting land tenure, and water rights), institutions involved (providing extension services, training and various other support services) and research.

The economic and livelihood **activities** explained in this context are divided into on-farm and off-farm income. There is a large dependency on off-farm income, and the largest portion (49%) of the farmers actually obtains 100% of their income from formal employment, self-employment, social grants or remittances. Table 1, below shows the percentage of farmers with different levels of off-farm income.

Table 1: Percentage of farmers in the Rust de Winter farms, with different levels of percentage off-farm income for their households

Households (%)	Percentage off-farm income
18.18	10%
6.06	25%
6.06	50%
21.21	75%
48.48	100%

Some farmers (15%) sublease their land for grazing and are not engaged in any farming activities themselves. The most common agricultural practice is livestock farming, with 60% of the farmers solely engaged in livestock farming, whether at large-scale, small-scale, or simply for subsistence

purposes. Seventeen percent of farmers are combining livestock with arable production. Even though parts of the Rust de Winter farm is said to comprise of 13% of South Africa's best soils, only a small portion (< 8%) of the farmers is solely engaged in arable farming. The current farming activities on the Rust de Winter farms are shown in Figure 2 below.

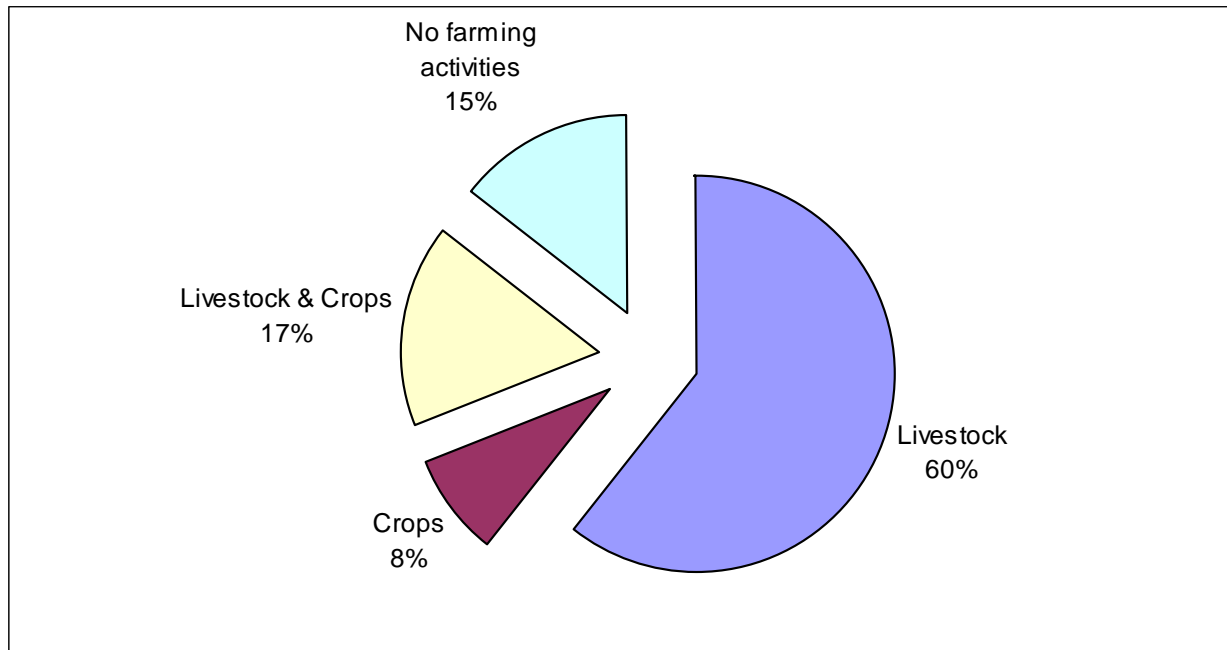


Figure 2: Percentage of respondents engaging in various farming activities as part of their livelihoods on the Rust de Winter Farms

Access to, availability of, and control over **resources** have been indicated as the most important factors affecting farmers' decision making process. Water availability for irrigation purposes is determined by the quotas allocated to farmers, which are in turn influenced by the changing demand for industrial and household use. Land ownership and occupation of land have a great influence on farming activities.

The **dynamics** considered as influential to the livelihoods of the Rust de Winter farmers are: the historic developments that occurred in the area, involving land ownership and water quotas, the vulnerability of the community through the level of poverty and the possible loss of land through land claims and the climatic changes experienced globally.

The characteristics of the farmers (**People**) greatly influence their livelihoods and incentive to certain activities. Three issues have been identified as main elements of the characteristics of the people: their level of knowledge and skills, their culture, and their age. In this context, knowledge refers to production, financial management and marketing skills. The cultural diversity in the area causes a divide in the communities, which negatively affects organisational structures. The majority of the farmers are older than 50 years and therefore less capable in farming than before. The farming activities correlates with the age of the farmers and the sustainability of the farm are also determined by the existence of a successor and the capabilities of and/or incentives for these successors.

The **organisations** involved in the Rust de Winter farms are not very structured. There is a Rust de Winter Coordination Forum, but their involvement is limited to water issues. Partnerships with white commercial farmers are considered in the livelihood analyses, under organisational structures, due to the effect it has on the community. Farmers involved in such partnerships benefits highly in terms of farm managements and organisation among them. The existing partnerships are for high value crop production under irrigation, and for utilising of extra resources, such as hay making.

The sustainability of the livelihoods in Rust de Winter is illustrated in Figure 3 below.

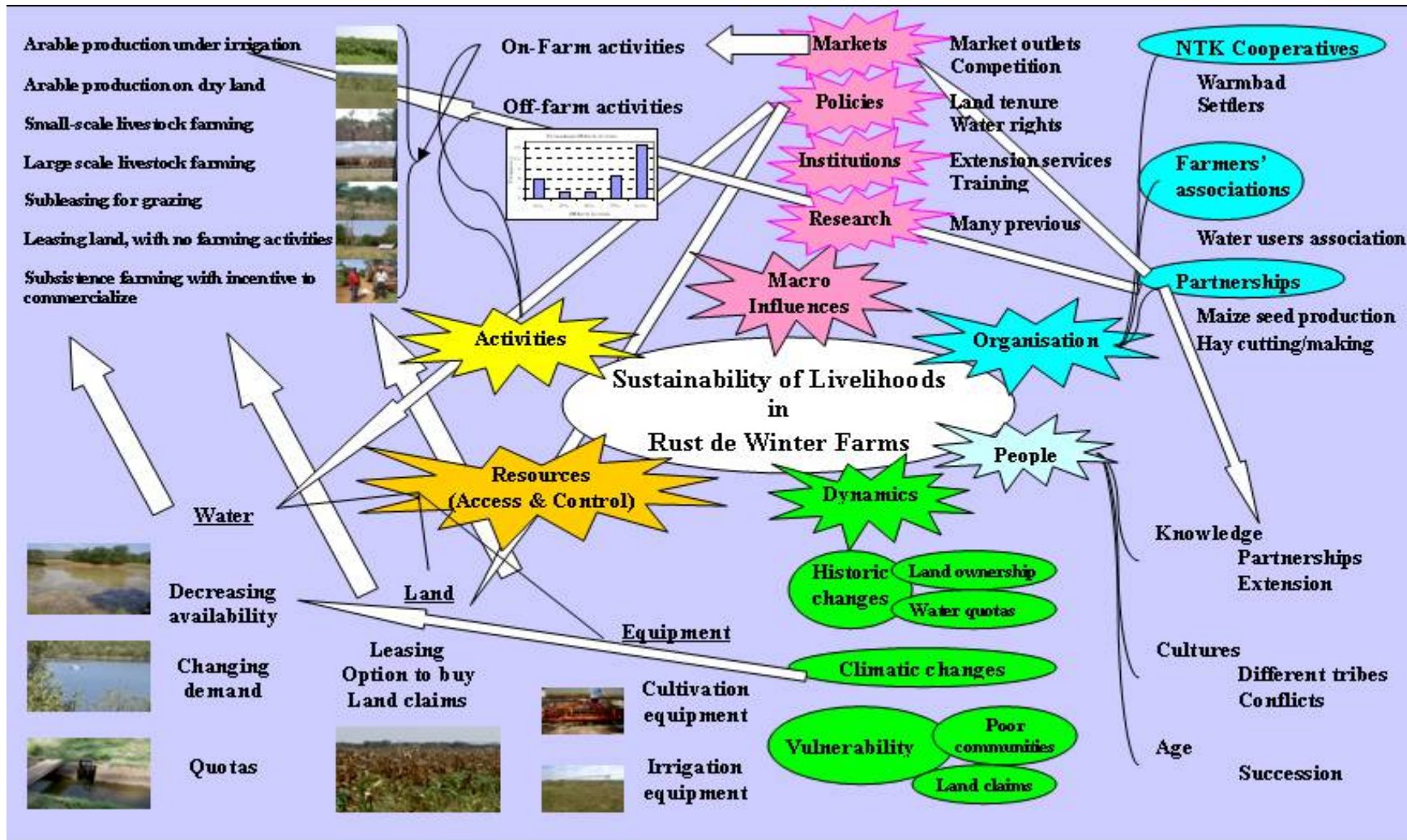


Figure 3: A broad contextual analysis of the sustainability of livelihoods on the Rust de Winter Farms

4.2 Analyses of crop and livestock farming

4.2.1 Farm sizes

Cattle farming are currently the most important farming activity in the area, with only few and/or small percentages of farms being allocated to crop production. Table 2, below, shows the number of farms grouped within the specified farm size ranges.

Table 2: Number of farms grouped within the specific farm size ranges.

Farm size ranges (ha)	Number of farms
1 - 20	1
21 - 50	24
51 - 100	7
101 - 200	12
201 - 500	7
More than 500	2

Source: Gauteng Provincial Department of Agriculture, 2005

23% of farmers are engaged in arable production. Only 8% of farmers are solely occupied in arable farming, whereas the rest, are involved with livestock farming. Figure 4 below indicates the size of land used for grazing and arable farming, respectively.

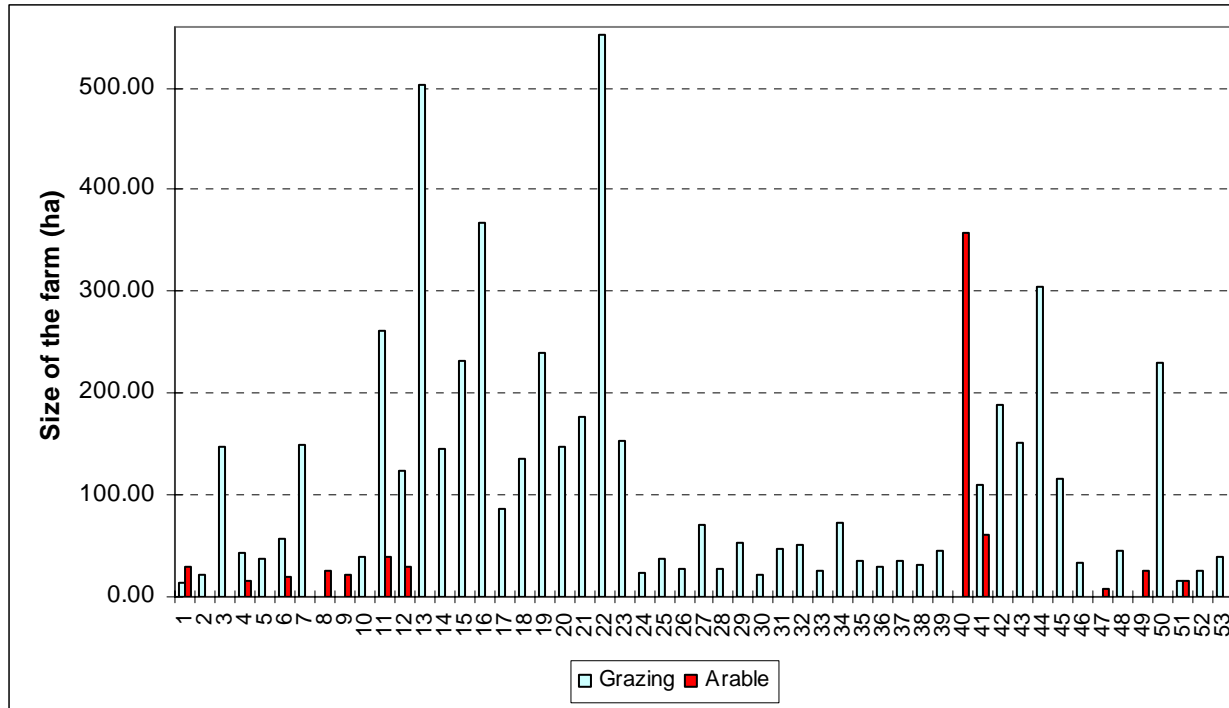


Figure 4: Total size of land (ha) of the Rust de Winter farmers in Limpopo and the distribution to livestock and crop production

Source: Gauteng Provincial Department of Agriculture, 2005

4.2.2 Farm typologies

Rust de Winter is no different from other rural areas; its households are heterogeneous. Households differ in their availability over physical, human, social and financial capital. A typology entails variation of assets in the households under the same natural conditions. To identify a typology for the Rust de Winter farms, multivariate analysis was conducted. A three-pronged criterion was considered, including farm size, sources of income and aspirations about farming. There are four types of farming activities identified for the purpose of the study:

- Crop farming under irrigation (vegetables and field crops),
- Crop farming under dryland conditions,
- Livestock farming and,
- Mixed farming

Different typologies are affected differently by the problem and as such require different strategies to address the problem, under the different scenarios. The aim is to identify mutually beneficial strategies in solving the problem.

4.3 Opportunities for commercial crop production

Considering the context of the development problem, the study, focussing on arable farming, identified that active and sustainable utilization of resources together with exploitation of opportunities can make arable Rust de Winter Farmers commercially viable. The focussed contextual study narrows the general livelihood context to only the actively engaged arable farmers, farming under irrigation and dry land conditions, as well as those subsistence arable farmers with the incentive to farm on commercial level.

Opportunities identified, for arable farmers to become commercially viable, include improving crop management, financial management, and utilizing marketing opportunities. Farmers need to develop strategies to manage risks, which include crop insurances or diversification of enterprises to spread risks. The farmers involved with partnerships, have easier access to sufficient capital to invest in risk management strategies. In order to cope with fluctuating prices, farmers need to adapt to changes in supply and demand conditions and produce according to available market possibilities. Farmers used to sell their produce at cooperatives at Warmbad and Settlers and farm gate stalls. The farmers, in partnerships currently sell to Pioneer Hybrid International market, on predetermined contracts. The challenges of entering the more sophisticated markets are to meet the high requirements of quality and quantity. To satisfy the markets, farmers need to get used to quality control systems, get access to timely market information and be able to produce quality products for the market (Standard Bank, 2005).

Figure 5 below provides a schematic explanation of the central research question, being focussed on arable farmers, including resource availability and existing opportunities, to conclude into a hypothesis towards a solution of the problem.

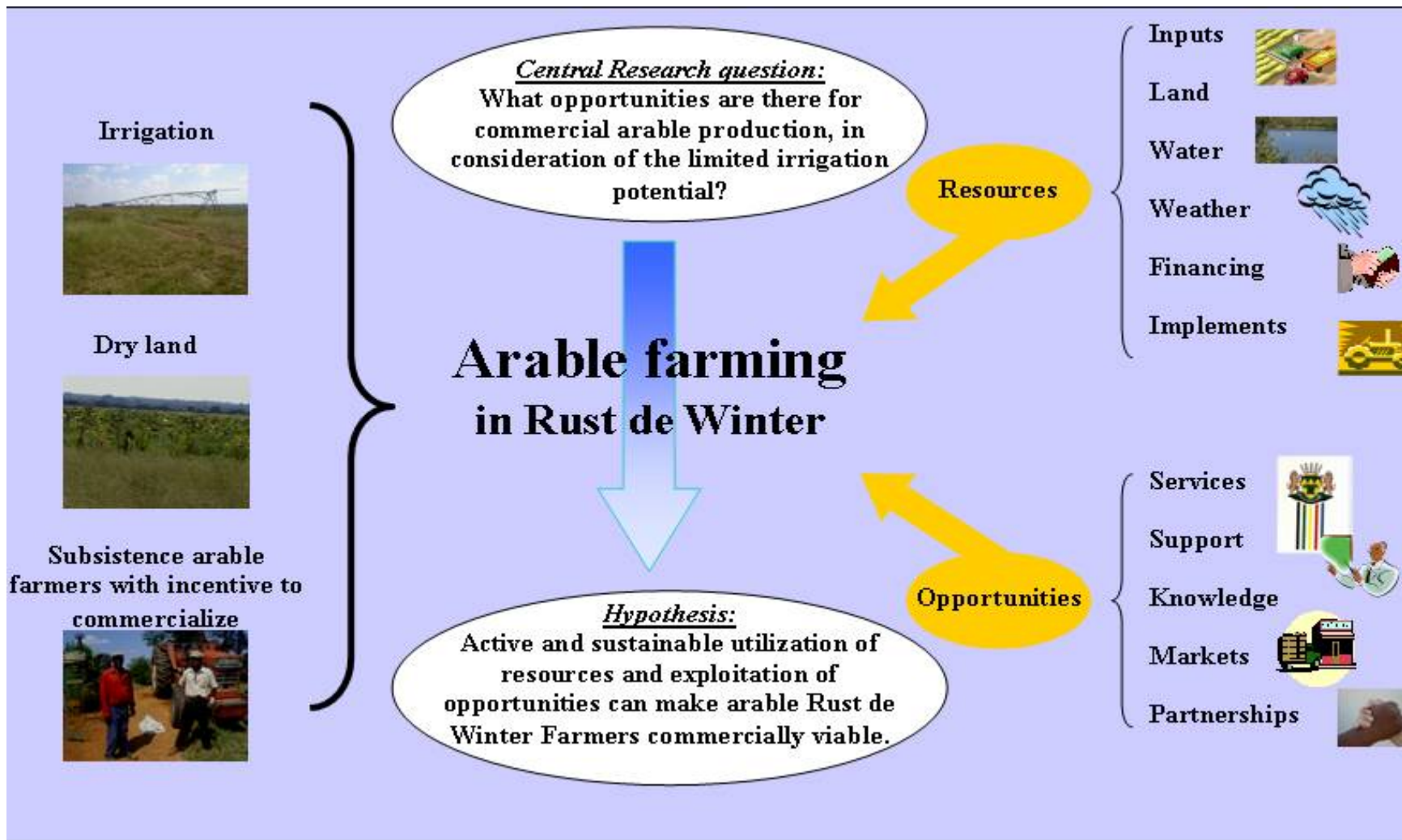


Figure 5: A focussed context analysis of the opportunities for commercial production of the Rust de Winter Farms, in consideration of the limited irrigation potential

4.4 Stakeholder analyses

The stakeholder analyses involve the identification of the relevant stakeholders, considering their objectives towards the research problem, and then obtaining their perspectives on the problem situation and possible solutions. A concerning factor, with regard to the Rust de Winter farming operation is the number of weak stakeholder linkages.

Key stakeholders involved in this study was the Limpopo Department of Agriculture (LPDA), Gauteng Department of Agriculture (GPDA), Department of Land Affairs (DLA), Department of Water Affairs and Forestry (DWAF), Bela-Bela Municipality, Agricultural Research Council (ARC), Land Bank, Commercial farmers in partnerships with local farmers, NTK cooperative, various supermarkets and the Farmers themselves.

4.4.1 Perception matrix

The stakeholder perception matrix gives a clear indication of the various stakeholders' perceptions on the problem situation in Rust de Winter farms and the possible solutions to commercialising arable farming. Table 3 indicates the shared perceptions on the problem situation and the possible solutions. There are two cases where the perceptions were directly contradictory to each other. This is indicated in dark and light grey, respectively.

Table 3: Stakeholder perception matrix

Clusters of stakeholder	Shared perception on problem situation	Shared perceptions on possible solutions
LPDA, DLA, DWAF, Partnerships: Production, Partnerships: Resource utilization, Irrigating farmers, Dry land farmers, Mixed farmers, Subsistence farmers	Limited access to water	Improved access to water for the farmers
DWAF, DLA, GPDA	Shortage of water in the dam	
DLA, partnership: Resource utilization	Lack of clarity on water allocation	
DWAF, Partnership: Production, Partnership: Production	Power play between government departments – No decision making on water allocation	
Partnership: Production, Partnership: Resource utilization, RESIS, Irrigating farmers, Commercial farmers	Land claims (No land ownership, No water rights)	
LPDA, DLA, Partnership: Resource utilization, Land Bank, Dry land farmers, Commercial farmers	Damaged infrastructure	
NTK, Dry land farmers, Subsistence farmers	<i>Erratic rainfall patterns and climatic changes makes dry land production unfeasible</i>	
DLA, RESIS, Commercial farmers	<i>Unusable groundwater / boreholes</i>	
Partnership: Resource utilization,		<i>Dry land production is possible</i>
Partnership: Resource utilization, Partnership: Production,		<i>Boreholes are feasible source of water</i>
DWAF, MHFP, Partnership: Resource utilization, Supermarkets, RESIS	Wrong crop production	Provision of training / support / long term guidance
NTK, DLA, Dry land farmers, Mixed farmers, Subsistence farmers, Commercial farmers	Lack of financing	
DWAF, Partnership: Resource utilization, Partnership: Production, Land Bank, Dry land farmers, Mixed farmers, Commercial farmers	Lack of technical and management skills	
LPDA, Partnership: Resource utilization, Partnership: Production, NTK	No incentive to farm and under-utilization of resources	
DLA, DWAF, Partnership: Resource utilization, Partnership: Production, Supermarkets, MHFP, RESIS, Irrigating farmers, NTK, Commercial farmers		Produce for committed and specific markets (e.g. Vegetables, large quantity, high-value, high quality)
LPDA, DLA, RESIS, Dry land farmers, Mixed farmers		Provision of infrastructure
DWAF, Partnership: Resource utilization, Partnership: Production, MHFP, Supermarkets, Irrigating farmers, Dry land farmers, Commercial farmers		Partnerships and collaborations
LPDA, DLA, DWAF, NTK, Land Bank, Dry land farmers, Mixed farmers, Subsistence farmers		Improved effective extension services

4.4.2 Stakeholder linkages

The importance of the stakeholder linkages matrix is emphasized through the identified power play and lack of influential decision making towards policy and regulations on the Rust de Winter farms. The matrix was used to evaluate the strength and relevance of linkages between stakeholders, and it served as a guide for improving relationships as well as negotiating preferred linkages. The criteria developed for assessing linkages are:

- Frequency of contact
- Formal / informal contact
- One way / two way contact
- Relevance of other stakeholders' services
- Accessibility of services

The opinions of the respective stakeholder's linkages with others are presented in the columns. DWAF, LPDA and GPDA had mutual perception on their linkages. DWAF, commercial farmers and the ARC were not available for comments. Sometimes the service providers and the farmers had conflicting perspectives about their current linkages with each other. Table 4 below shows the stakeholder linkages analyses.

Table 4: Stakeholder linkages analyses

Stakeholders	LPDA – extension services	GPDA – extension services	DLA	Rust de Winter farmers
LPDA – extension services				(weak) Seldom, one way contact, which is relevant, but lacks timeliness
GPDA – extension services	(+) Good, frequent contact, which is informal and two-way.			(moderate) Contact available and accessible on request only
DLA	(moderate) Often contact, which involves land tenure. Transparent, close linkage	(weak) Only in contact during renewal of leases, or changes in land tenure		(weak) Very seldom contact. Very relevant services, but is very inaccessible
Rust de Winter farmers	(+) Frequent, two-way contact	(+) Constant contact and permanent presence. There is both one-way (farmers’ days) and two-way contact.	(weak) Only contact when distributing land	
DWAF	(weak) Only contact if problem occur. Linkages is not transparent	(weak) Only in contact during changes in water allocations or other problems	(weak) Seldom in contact – only with changes in policy of land tenure and water allocation	(-) Very seldom contact, which is very formal and inaccessible.
Commercial partner farmers	(-) No contact	(-) No contact	(-) No contact	(+) Often, two-way contact, which are very relevant and completely accessible.
ARC	Unknown	(+) Frequent contact via existing research projects.	unknown	(moderate) Often, two-way contact, Provide relevant, but ill-timed services. Conflict between ARC projects

Note: (+) strong relation, (moderate) moderate relationship, (weak) weak relationship, (-) negative relationship.

4.5 Driving forces

Driving forces can be described as those factors causing changes in the livelihood, agricultural and political systems. They can include changes in social, technological, environmental, economic and political situation. The most influential driving forces, as prioritised by the Rust de Winter farmers are;

- The land policy, considering unresolved land tenure issues. The outcome of the unresolved land claims issue, will determine the way forward for these farmers.
- The availability of water, determined by the National Water Act. Access to sufficient water is the biggest determining factor to choice of farming practices.
- The availability of markets and access to marketing contract drives the decision making on production.
- Non-agricultural employment opportunities, compared to agricultural opportunities, will determine, according to opportunity cost, the incentive for farmers to actively engage in farming operations or not.
- Access to partnerships with commercial farmers influences their level of success in farming.
- Availability of opportunities, such as gaining knowledge and skills, access to technology and access to funds, will determine the ability to utilise available resources.
- Availability and sustainability of natural resources on the farm, will determine the farming practices.
- The effect of climatic changes will cause changes in decision making.

4.6 Future scenarios

A future scenario is a possible future situation resulting from a combination of driving forces. Scenario planning is about exploring alternative pathways into the future. The two versions of the impact of the scenarios are presented in Table 6 below.

Table 6: Impact of the future scenarios for Rust de Winter

Positive scenario	Negative scenario
Increased availability of water for irrigation purposes	Decreased availability of water for irrigation purposes
Land ownership (Title deeds for farmers)	Loss of land (Land claim approved)
Increase in market demand and utilisation of market opportunities	Decrease in market demand and less market opportunities
On-farm opportunities more feasible than off-farm opportunities	Off-farm employment opportunities more feasible than on-farm opportunities
More reliable and predictable rainfall patterns	More erratic and unpredictable rainfall patterns

4.7 Development strategies

Stakeholders need different research and development options due to their varying capabilities, resource endowments, livelihood strategies, interests and vulnerabilities. The identified and prioritised strategies, towards commercialising arable farming in the process of improving the livelihoods in the Rust de Winter farmers, are as follows;

- Capacity building for farmers
- Rehabilitation of boreholes
- Production of high value crops
- Value adding for both crops and livestock
- Producing drought tolerant crops
- Diversification of crop farming with livestock
- Partnerships between emerging farmers and commercial farmers
- Shift to game farming

Strategies were identified by all stakeholders involved, and prioritised by the farmers. These strategies are screened according to potential benefits and probable costs, to verify their validity, feasibility and practicality. The potential benefits were considered from economic, agro-ecological and sociological perspectives. The listed screenings of the potential benefits are shown in Table 7 below.

Table 7: Screening the listed strategies through the economic, agro-ecological and sociological implications

Strategy	Economic implications	Agro-ecological implications	Sociological implications
Capacity building	Increased economic opportunities to be explored through education	Better knowledge on utilization of resources	Improved knowledge and opportunities
Rehabilitation of boreholes	More agricultural economic activities through water availability	Utilization of ground water	Most farms have access to boreholes
Production of high-value crops	High risk; high cost; high profit margin; Market based production	Utilization of water allocation	Improved livelihoods
Value-adding	High profit margins; Secure market outlets; High capital requirements	Most effective use of natural resources	Entrance to highly commercial market
Drought tolerant crops	Low input costs; available markets	Erratic rainfall	Serve the household needs.
Diversification with crop and livestock farming	Spreading the risk	Less water required than for arable production; Utilization of arable potential as well as grazing capacity	Cultural preference of agricultural practices
Partnerships for production	Improved and secured markets	Utilization of water allocation Sharing of resources	Transparent planning; Business development required
Partnership in utilizing extra resources for extra income	Extra on-farm income	Utilization of under-utilized resources; Resources should be controlled	All farmers can benefit
Game farming	Extremely high capital investment required;	Minimum disturbance of natural resources	Require high level of marketing and management skills

The screenings of the probable costs of the strategies are considered through results from averages from individual farmers responds, group result from farmer and averages of individual stakeholder responds. The probable costs were analysed through the probability of the development strategy to take place and the time and duration of implementation and the implementation cost.

Most strategies that were rated with a high a probability of occurrence by the farmers were rated with a moderate probability of occurrence by the other stakeholders, and vice versa. Only the strategies of producing high value crops and implementing training were rated high by both the farmers and the other stakeholders. An overview of the probability ranking of the development strategies is shown in Figure 7 below.

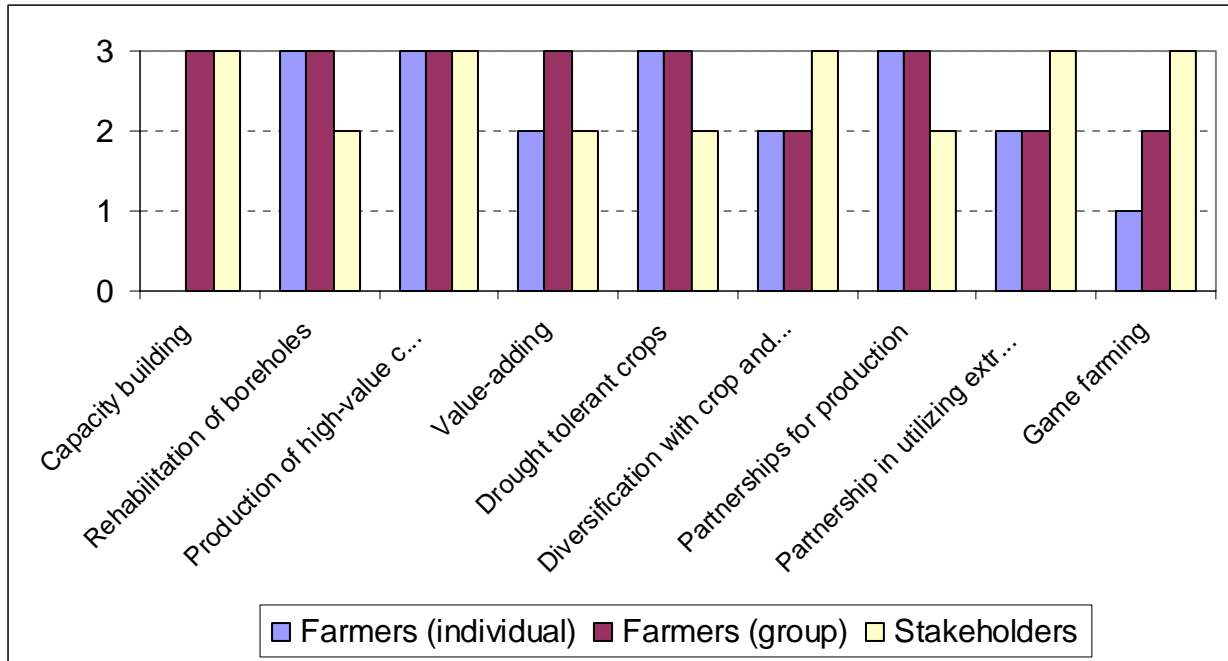


Figure 7: Probability of development strategies according to individual farmers, group of farmers and stakeholders

Note: 1=Low, 2=Moderate, 3=High

The perception of the time/duration of implementing the strategies differed amongst farmers and between farmers and stakeholders. Their perceptions of the time/duration of implementing the strategies are shown in Table 8

Table 8: Time/duration of implementing the different strategies, according to the farmers and the stakeholders

	Farmers (individual)	Farmers (group)	Stakeholders
Capacity building	Immediately	1 season	5 years
Rehabilitation of boreholes	Immediately	Immediately	5 years
Production of high-value crops	1 Season	Immediately	5 years
Value-adding	Immediately	1 season	1 year
Drought tolerant crops	1 Season	1 season	5 years
Diversification with crop and livestock farming	1 Season	Immediately	5 years
Partnerships for production	1 Season	1 season	5 years
Partnership in utilizing extra resources for extra income	1 Season	Immediately	5 years
Game farming	5 years	1 year	5 years

The very important aspect to consider when screening strategies is the proposed costs required to implement the specific strategies. The stakeholders considered some of the proposed strategies to be more expensive than the farmers and the individual farmers assessed some strategies to be cheaper than the group of farmers. The costs involved in implementing the strategies, as expected by the farmers and the stakeholders are shown in Figure 8 below.

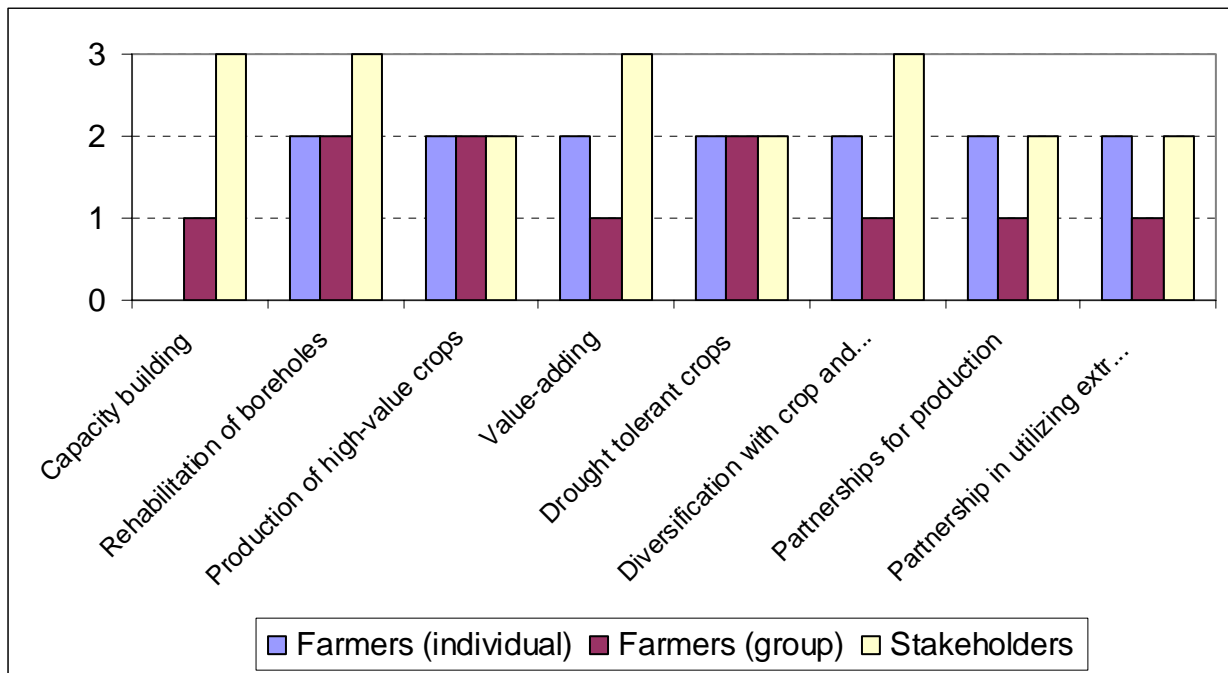


Figure 8: Cost of implementing the development strategies

Note: 1=Affordable, 2=Moderate, 3=Expensive

5 Conclusion and recommendations

By applying the ARD procedure, it allowed for a multi-stakeholder approach in identifying opportunities for the farming operations, proposing strategies towards development and stating recommendations to solve the complex problem of commercialising arable farming operations in the Rust de Winter farms. According to the ARD approach, a holistic view over the livelihoods of the Rust de Winter farms was incorporated to contextualise the problem. The study was focussed to arable farmers, and strategies were identified by considering ecological, social and economic analysis.

The identified strategies were screened, and can be justified as follows:

- **Capacity building** for the farmers, in terms of technical advice and long term guidance in farm management skills, can capacitate them to utilise the limited available resources and create a sense of entrepreneurship. In essence, capacity building should be done in conjunction with each strategy to facilitate implementation and to ensure results.
- Strategies of **rehabilitation of boreholes**, planting **high value crops** and on-farm **value adding** are all interrelated. If water can be made available through revitalization of boreholes, farmers can fully engage in arable farming. This would mean that most farmers, with the relevant guidance and support can produce high value. The farmers can increase their profits by adding value to their produce either individually or by collaborating.
- If the boreholes can not be revitalized and water allocation increased, it would be necessary for farmers to plant **drought tolerant crops**, considering careful identification of suitable crops, according to market demand.
- **Diversifying with livestock** practices, can be a very effective risk management strategy during unfavourable years where yields and prices might be low.
- **Partnerships** with commercial farmers guided the emerging farmers to commercial production, but it should result, over the long term, in the farmers being independent, financially sustainable and productive, like their commercial partners.

- The strategy of **shifting to game farming** was eliminated, due to the intensity of game farming, and the high capital and land requirements.

All stakeholders are now in the position to consider the proposed strategies and formulate action plans accordingly. There are some essential elements that need to be in place and factors to consider, before any strategies and action plans can be implemented. Among these elements and factors, the most important are as follows.

- The land tenure issues need to be resolved, to ensure landownership and therefore credit availability and access to water rights.
- A feasibility study on the water availability of the Rust de Winter dam is essential, to determine appropriate water allocation for agricultural purposes. Improved access to water and a more transparent process thereof will increase opportunities to commercialise arable farming.
- Sourcing and securing markets are essential before any production is done. Farmers should not sell what they can produce, but produce what they can sell.
- Coordination among stakeholders is essential to ensure that there is clear delineation of duties, improved awareness of each other's function, no duplication of services and a more effective decision making process.

Considering the problem situation, the farmers need to take action in their own hands, and depend less on external support. If the external environment is enabled for development, farmers utilise the available resources and exploit the available opportunities, there are no reasons for them not to become commercially viable.

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