AN ECONOMIC ANALYSIS OF THE CONTRIBUTION OF WATER USE TO VALUE CHAINS IN AGRICULTURE

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LIST OF ACRONYMS AND ABBREVIATIONS

ANC	African National Congress
ARC	Agriculture Research Council
BEE	Black Economic Empowerment
BFAP	Bureau for Agricultural Policy
CAET	College of Agricultural Economics and Trade
CDE	Centre for Development Enterprise
CDF	Cumulative Probability Distribution Function
CLARA	Communal Land Rights Act
CPA	Communal Property Association
CRDP	Comprehensive Rural Development Programme
DBSA	Development Bank Southern Africa
DEA	Data Envelopment Analysis
DMU	Decision Making Unit
DTI	Department of Trade and Industry
EAC	Eksteenskuil Agricultural Cooperative
EFA	Eksteenskuil Farmers' Association
EFO	Ezemvelo Farmers' Organisation
ESTA	Extension of Security of Tenure Act
FIAS	Foreign Investment Advisory Service
FLO	Fairtrade Labelling Organisation
FPM	Fresh Produce Market
GMO	Genetically Modified Organisms
HACCP	Hazard analysis and critical control points
IIED	International Institute for Environment and Development
ILO	International Labour Organisation
KMO	Kaiser-Meyer-Olkin
LCA	Life cycle assessment
LRAD	Land Redistribution for Agricultural Development
LRB	Land Rights Bill
MEC	Member of Executive Council
NDA	National Department of Agriculture
NDP	National Development Plan
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organisation
NIE	New Institutional Economics
NPC	National Planning Commission
OLS	Ordinary Least Squares
OWC	Orange River Wine Cellars
PCR	Principle Component Regression

PTO	Permission to Occupy
RSA	Republic of South Africa
SAD	South African Dried Fruit
SADT	South African Development Trust
SCP	Structure-Conduct-Performance
SLAG	Settlement/Land Acquisition Grant
SME	Small and Medium Enterprise
TCE	Transaction Cost Economics
TIS	Thabina Irrigation Scheme
TRANCRAA	Transformation of Certain Coloured Rural Areas Act
UK	United Kingdom
USAID	United States Agency for International Development
WUA	Water Users' Association
WWF	World Wildlife Fund
ZCAC	Zanyokwe Central Agricultural Cooperative
ZIS	Zanyokwe Irrigation Scheme

EXECUTIVE SUMMARY

ECONOMIC ANALYSIS OF THE CONTRIBUTION OF WATER USE TO VALUE CHAINS IN AGRICULTURE

BACKGROUND AND MOTIVATION

Poverty is a major cause for concern in South Africa. According to the United Nations Development Programme (UNDP) (2003), 48.5% of the South African population lives below the poverty line. The Water Research Commission (WRC) (2008) argues that the only way in which an impact can be made to improve the livelihoods of the rural poor is by giving them access to available resources or assets in agriculture. The new democratic government of South Africa also recognises the role that can be played by agriculture in alleviating rural poverty as is evident from the prominence of agriculture in the National Development Plan (NDP) of the National Planning Commission (NPC) of South Africa and the Comprehensive Rural Development Programme (CRDP) that is implemented by the Department of Rural Development and Land Reform. According to the NDP (2011) agriculture (commercial and small-scale) has the potential to create about one million new jobs (direct and indirect) by 2030. The NDP (2011) argues that the expansion of irrigated agriculture, supplemented by dry-land production where feasible, will be the driving force to meet the vision of the NPC for 2030 that South Africa's rural communities should have greater opportunities to participate fully in the economic, social and political life of the country. CRDP is part of government's plans to accelerate growth in rural areas. Essentially the programme aims to enable people living in the rural areas to use the natural resources at their disposal to become economically active (Republic of South Africa (RSA), 2009). Government is of the view that small-scale farmers can contribute significantly to the reduction of food insecurity (Molewa and Doidge, 2010). According to Backeberg and Sanewe (2010) agriculture contributes to economic development and rural livelihoods by providing food products, but it also represents a range of opportunities for earning income in production, processing, distribution and retailing phases of the food value chain. The role of agriculture thus extends the mere provision of food to rural communities. Emerging farmers are thus expected to have a major role to play in the alleviation of rural poverty in South Africa.

Since the beginning of democracy in South Africa in 1994, government has committed itself to working towards decreasing rural poverty through the implementation of policies that include initiatives to link emerging farmers to commercial agricultural value chains (Letsoalo and Van Averbeke, 2005). Government has also spent a large amount of money on research projects on

ways to successfully link emerging farmers to commercial agri-food chains, and on the revitalisation of smallholder irrigation schemes (Denison and Manona, 2007).

PROBLEM STATEMENT AND OBJECTIVES

Despite the commitment from government and the huge investments made to assist emerging farmers from smallholder irrigation schemes to be integrated into commercial agri-food chains, actual success stories where emerging farmers are successfully operating in commercial agri-food chains are scarce. The small number of success stories means that the objective to allow farmers to improve their livelihoods through irrigated agriculture is not met. It is noted that access to agricultural water plays a necessary role in increasing productivity, but access to water alone is not a sufficient condition to enhance productivity and alleviate poverty (Hussain and Perera, 2004). The farmers have to generate sufficient levels of income from their irrigation activities in order to alleviate poverty. The poor performance of the farmers despite all of the research may be an indication that the approaches to the research may be insufficient to get to the core of the problem, and to allow the researchers to come up with workable solutions to overcome the problems.

The objectives of this study are:

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Objective 1: To develop a conceptual framework based on a literature review on value chain analysis with specific reference to water utilisation and competitiveness in agriculture that encompasses (amongst others) an understanding of:

- The concept of value chain analysis;
- Application of value chain analysis in agriculture;
- Contemporary challenges of local and global value chains; and
- Approaches, methods and models available for analysis of the value chain.

Objective 2: To demonstrate the application of the conceptual framework for commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both) and to elaborate on how the suggested framework would generate solutions within the ambit of the rationale.

Objective 3: To determine the research approach, method and models for analysis of value chains with application to commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both).

Objective 4: To empirically analyse and model selected value chains in commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both) with specific attention to (amongst others):

- Mapping of water use at critical points in the value chain;
- Optimisation of water use in the whole value chain;
- Mainstreaming of marginalised participants in the economy;
- Employment creation and poverty eradication;
- Improving competitiveness in the value chain.

It is noted that the objective to optimise water use along the value chain is very much a novel idea. Research to optimise water use typically centralise around improving water use efficiency at farm level mainly through irrigation scheduling (Annandale *et al*., 2011), improving irrigation systems (Reinders, 2011), or through economic optimisation of farm-level irrigation decision making (Grové, 2011). No attention is paid towards water use at the value adding nodes downstream from the farm gate.

APPROACH AND METHODOLOGY

The point of departure of the study was a comprehensive literature review in order to develop a conceptual framework that could be used to analyse the value chains within which emerging farmers could be integrated. Given the scope of the analysis that was required to meet the objectives of this study, the conceptual framework that was used consists of a problem tree analysis and an integrated New Institutional Economics (NIE) and Structure-Conduct-Performance (SCP) analysis of the three levels (micro, macro and meso) that comprise the value chain within which the emerging farmers are participating. The nature of the conceptual framework requires both qualitative and quantitative analyses. Qualitative analyses were conducted in the application of the problem tree analyses and the NIE framework to analyse the social environment (levels of social embeddedness) and institutional environment within which the farmers operate, and the optimal degree of vertical coordination (governance structures) that will minimise the transaction costs they face in transactions. Within the application of the SCP framework, qualitative analyses were used to investigate the physical environment (structure) within which the farmers operate, the way they behave in the physical environment (conduct), and the level of performance in terms of production volumes and income generated. The analysis of the resource allocation level within the NIE framework consists of quantitative analyses of the levels of efficiency with which production inputs are used to generate income. Current Data Envelopment Analysis applications were extended to distinguish between the production sub-decision making unit, and the marketing sub-decision making unit. The distinction between the two sub-DMUs allowed the researchers to identify which activity (production or marketing) is associated with higher degrees of inefficiencies and requires the most urgent attention. The integrated NIE and SCP framework was applied to three case studies: the case of raisin producers from Eksteenskuil in the Northern Cape Province, the case of vegetable producers from Zanyokwe Irrigation Scheme, and the case of maize and vegetable producers from Thabina Irrigation Scheme. The farmers from the

different case studies are very diverse and participate in value chains with different degrees of success.

The application of the integrated NIE and SCP framework ensured that the researchers developed a comprehensive understanding of the way in which the farmers from the respective case studies behave and perform within their value chains, and also the reasons why the farmers behave the way they do. Next the value chains were analysed. The traditional type of value chain analysis was extended to also consider the regulatory framework (value chain influencers) that influence the behaviour of the actors who are directly involved with moving the physical product along the chain (value chain players), and also the support services that are available to support the value chain players to comply with the rules and regulations specified by the value chain influencers. The value chain analysis consists of an analysis of the product flow to understand how the products move from the input suppliers to the end consumers, the distribution of water use along the chain to gain insight into the nodes where most of the water is used and deserve attention to improve the efficiency with which water was used all along the chain, and the distribution of the value of the product along the chain to ultimately calculate the value of the water that was used at each node.

After the comprehensive analysis of the value chains, problem tree analysis was used to investigate the stumbling blocks that constrain the ability of the farmers to produce large volumes of good quality produce (production sub-DMU), and the ability of the farmers to maximise their income from selling their produce (marketing sub-DMU). Based on the problem tree analyses, some potential solutions were identified that may contribute to overcoming the stumbling blocks. The problem tree analyses were done based on discussions with small groups of farmers in the respective case studies. After the potential solutions were identified, a net cash flow optimisation model was applied to model the potential impact of the recommended solutions on the cash flow positions of the farmers. Information that was obtained from the applications of the DEA analyses to quantify the technical efficiency levels of the farmers was used to identify the technology set for the cash flow analyses.

The approach that was followed in this study required an intensive data gathering process, both qualitative and quantitative analyses, and a process of validation of the findings. Over the course of the project, the number of days spent at Eksteenskuil to gather information amounted to 54. Zanyokwe Irrigation Scheme and their buyers were visited for a total of 40 days, while the farmers from TIS were visited for a total number of 25 days. Without such intensive engagement with the small-scale irrigators it is impossible to apply the integrated NIE SCP framework developed in this research.

RESULTS AND CONCLUSIONS

The results from the analyses of the distribution of water use along the value chains show that the bulk of all of the water that is used along the value chain is used at farm level to produce the food products. Efforts to increase the efficiency with which water is used along the value chain thus should focus the attention on water use at farm level. The enforcement of water institutions has a major role to play in improving water use efficiency at farm level.

Optimising water use along the value chain depends on the reasons for providing emerging farmers with irrigation water. The results from the analyses show that the marketing channel that is associated with the highest total value added to the physical product is not necessarily the option that yields the highest return for the farmers. Similarly, the marketing channel that is associated with the highest total value added to the water that was used along the chain is not necessarily the channel that earns the highest return for the farmers from the water that was used to produce the product. Care should thus be taken to scrutinise the definition of optimal water use when advising emerging farmers with the aim to optimise water use along the value chain.

A comprehensive analysis of the value chain is required to determine the degree of accessibility of the different marketing channels that are available in the value chain. The attributes of the produced product (i.e. quality) is the major determinant of which of the different marketing channels can be accessed. While emerging farmers who use marketing channels other than the high paying channels (i.e. hawkers and retail stores) may seem to make sub-optimal decisions, the attributes of their products may mean that they do not have access to the high paying options. In such a scenario the seemingly sub-optimal decision may actually be the optimal choice. A comprehensive understanding of the attributes of the product and the requirements of the different marketing channels thus is necessary before advising the farmers in terms of the specific marketing channels to target to ensure that the advice will result in the optimal outcome.

A number of key success factors were also identified from the results of the study that prove to have great potential to contribute towards the successful participation of emerging farmers in commercial agri-food chains. The key success factors include, amongst others, effective support to emerging farmers; effective collective action among emerging farmers; actions to minimise the potential negative impact of cultural activities on the performance of the farm businesses; secure tenure; tailor made financing schemes; and coordinated efforts to overcome stumbling blocks. The results from this study show that emerging farmers have great prospects to increase their production levels by using their production inputs more efficiently. The results also show that farmers can substantially improve their cash flow positions by improving the degree of efficiency with which they use their inputs. It is important

to note that the results show that the farmers can increase their production at current input levels and within their existing technology set. Thus, despite the cash flow constraint that constrain emerging farmers from applying recommended levels of production inputs, and the factors that exclude them from adopting sophisticated technology, the farmers still should be able to increase their production levels. Effective support is required to help the farmers to improve the degree of efficiency with which they use their production inputs. The results also show that (private sector) lead firms in the value chain have an important role to play in providing the required support. Lead firms have a comprehensive understanding of the quality requirements, and also often have technical advisors that have the knowledge and experience to support farmers to produce larger volumes of good quality crops. Lead firms, however, need incentives to invest in the support of emerging farmers. If the lead firm can only access the incentives (i.e. tax benefits) through the performance of the emerging farmers, a complementary relationship will exist between the lead firm and the emerging farmers. Such a lead firm will have a vested interest in the performance of the farmers, and hence a strong incentive to actively support the farmers to improve their performance. The complementary relationship may also convince the lead firm to enter into a formal vertically coordinated relationship (i.e. relation based or equity based alliances) with the farmers. The optimal type of relationship depends on the characteristics of the transaction. Care should be taken not to force specific types of relationships (i.e. strategic alliances) on emerging farmers and the lead firms, but rather to allow for a comprehensive analysis of the transaction to identify the appropriate type of relationship.

The second key success factor relates to effective collective action. The results show that the scale of operations of emerging farmers typically is small. Collective action is required for emerging farmers to benefit from scale advantages, and to contribute towards decreasing the transaction costs faced by the buyers in commercial agri-food chains who deal with emerging farmers. Collective action *per se*, however, is not the sufficient condition for the successful participation by emerging farmers in commercial agri-food chains. The farmers should organise themselves into a collective entity to develop their businesses and not merely to access government grants as is currently the case in South Africa. The farmers should also be allowed to organise themselves in any type of collective entity that is most appropriate given their needs, instead of forcing them to form co-operatives in order to get access to the grants. Effective functioning collective entities also have an important role to play in stimulating farmer-to-farmer skills transfer. Farmer-to-farmer skills transfer has major scope to contribute towards improving the skills of the farmers to use their inputs efficiently.

The results from the analysis of the social embeddedness of the farmers at the three case studies show that cultural activities may have a detrimental impact on the performance of emerging farmers. The third key success factor is to identify all of the cultural activities in the region that may have a negative impact on the performance of the farmers under

consideration. Strategies then have to be formulated to minimise the potential negative impact of such activities on the performance of the farm businesses. It is important to note that the significance of cultural activities is not questioned in this study. The idea is to find solutions that will allow the farmers to participate in cultural activities without negatively affecting their farm businesses.

The next two success factors relate to the provision of an enabling environment for emerging farmers. Firstly, secure tenure for the farmers provides the basic incentive to invest in their farm businesses. Secure tenure also has some spin-offs that contribute towards overcoming some of the other stumbling blocks that typically exclude emerging farmers from participating in commercial agri-food chains. Secure tenure may give farmers access to credit to supplement their cash flow. Consequently, secure tenure may contribute towards allowing emerging farmers to intensify their production activities by applying the recommended input levels. The results from the cash flow optimisation model show that there are potentially substantial gains in net cash flow if the farmers were to intensify their production. Secure tenure will also allow prosperous farmers to expand their scale of production by buying or renting additional land from other farmers who do not want to farm anymore. Farmers with little aspirations to farm thus can still earn some income from their land if they are allowed to legally rent or sell their land to other farmers. Again it is recognised that the transfer of secure tenure to individual farmers is not the sufficient condition for the successful participation of emerging farmers in commercial agri-food chains. Ultimately the success depends on the entrepreneurship of the farmers to exploit opportunities that will be created through the transfer of secure tenure to individual farmers.

The second success factor that relates to the enabling environment is the provision of tailor made financing schemes to give emerging farmers access to credit to supplement their cash flow. The typical characteristics of emerging farmers disqualify them from having access to credit from commercial credit providers. The difficulty to change the characteristics of emerging farmers to meet the requirements of commercial credit providers suggests that it may be easier to create a tailor made financing product that are accessible given the typical characteristics of emerging farmers. There is, however, no guarantee that the farmers will use the credit to develop their farm businesses. During the development of such a scheme it is crucial to consider potential incentives and/or sanctions that will maximise the likelihood that the funds will be used for agricultural purposes.

Lastly, the results from this study show that the stumbling blocks that contribute to the exclusion of emerging farmers from participating in commercial agri-food chains are very much integrated. Efforts to overcome one or two stumbling blocks at a time may not have the desired outcome. A coordinated approach has to be followed to overcome the stumbling blocks. The last key success factor thus is to coordinate the efforts to overcome the stumbling blocks that

constrain the performance of emerging farmers. Especially since the responsibilities to overcoming certain stumbling blocks may reside in different governmental departments, it is crucial to coordinate efforts to ensure sustained benefits from such efforts.

ACHIEVING SET OBJECTIVES

A comprehensive literature review was conducted to understand the concept of a value chain, the different approaches of value chain analysis, and which role-players need to be considered in a value chain analysis that is concerned with water use and the competitiveness of emerging farmers as new entrants in an existing value chain. Based on the literature review a conceptual framework was developed (Objective 1) that consisted of problem tree analysis and an integrated New Institutional Economics and Structure-Conduct-Performance framework. From the review of the literature on the conceptual framework the research approach and methods of analyses were also identified (Objective 3). The developed conceptual framework was applied to three case studies (Objective 2) to gain insight into the behaviour and performance of the farmers within their social, institutional and physical environments. The feedback activity that moves information from the lower levels (resource allocation and performance) to the higher levels (social, institutional and physical environment) allowed for the recommendations for certain changes in the environment (social, institutional, and physical) that may manifest in improvements of efficiency and performance.

Objective 4 was achieved by extending the respective applications of the conceptual framework from Objective 2. For each case study the value chains were mapped and analysed in terms of the distribution of value along the chain, and the distribution of water use and the value of the water to produce the product and deliver it to the end consumer. Problem tree analyses were performed to identify stumbling blocks and potential leverage points that can be exploited to mainstream the farmers into the economy. Ultimately, a net cash flow optimisation model was used to model the potential impact of overcoming some of the stumbling blocks on the cash flow position of the farmers. Based on the results from the net cash flow modelling, recommendations were made to improve the performance of the farmers. It is noted, however, that analyses in this study did not directly address the ways to create employment and to improve the degree of competitiveness of the value chains under consideration. Objective 4 thus was not achieved in its totality, yet it was achieved to a satisfactory level.

RECOMMENDATIONS

Based on the findings from the three case studies, some recommendations can be made for emerging farmers to enhance their ability to successfully participate in commercial agri-food chains, for policy makers to formulate new policies and to adjust some of the existing policies to enhance the successful participation of emerging farmers in commercial agri-food chains,

and for future research that needs to be conducted to contribute to the topic of the optimisation of economic beneficial water use by the integration of emerging farmers into the main stream of the economy.

RECOMMENDATIONS TO EMERGING FARMERS TO IMPROVE THEIR EXISTING SITUATION

- Instead of viewing stumbling blocks (including strict rules and regulations associated with commercial agri-food chains) as a barrier to entry that exclude them from participating in commercial agri-food chains, emerging farmers must actively investigate strategies that will allow them to overcome stumbling blocks. Collective action has a major role to play to enable emerging farmers to overcome a number of the stumbling blocks. Farmers should negotiate and institute rules among themselves that will formalise their actions to improve coordination to allow effective collective action in efforts to overcome stumbling blocks.
- The farmers should strive towards the efficient use of their limited production inputs. Although it is recognised that the farmers do not have access to the recommended levels of the production inputs, the results showed that they can still substantially increase their production by improving the efficiency with which they use their current levels of inputs. Farmers should apply the information that is transferred through training sessions to allow them to benefit from more efficient use of production inputs.
- Farmers should strive towards the timely application of production inputs to ensure that the marginal benefit from the application of the inputs is as high as possible. The late application of production inputs was identified to have a major negative impact on crop yields. Farmers should make sure that they not only know the recommended input levels, but also the recommended time of application to ensure that they get optimal benefit from using the inputs.
- Farmers should endeavour to improve their skills that are required in the day-to-day decisions making activities on their farms. Farmer-to-farmer skills transfer has major scope in this regard. Emphasis on farmer-to-farmer skills transfers will also contribute to increasing the levels of social capital of the farmers. Given the crucial role of collective action in the successful participation of emerging farmers in commercial agri-food chains, farmers stand to benefit substantially from endeavours to increase farmer-to-farmer skills transfer.
- In order to ensure that farmers receive the maximum benefit from the time they spend attending training sessions the management committees of the collective entities of emerging farmers have to regularly conduct needs assessments to identify aspects/activities the farmers want/need training in. Such assessments will ensure that training sessions that are organised are relevant to capacitate the farmers to make decisions that will benefit their farm businesses.
- Farmers should strive towards buying the necessary production inputs soon after harvest before spending the revenue on non-farming items. The early buying of production inputs

may enable the farmers to apply the recommended levels of production inputs in a timely manner. The results from the cash flow optimisation model showed that there is major scope to improve the cash flow position of the farmers (a major stumbling block) if the farmers were to intensify their production processes.

- Emerging farmers should focus on ways to decrease the transaction costs faced by their buyers when dealing with emerging farmers. Buyers prove to be willing to deal with emerging farmers as long as it does not negatively impact their brands. Buyers require consistent supply of good quality produce, whether they procure from emerging or commercial farmers. Higher degrees of coordination among emerging farmers may contribute to a more consistent supply of fresh produce. Vegetable farmers should also grade their vegetables after harvest to differentiate between good quality vegetables and vegetables of a lesser quality. Only good quality vegetables should be sent to retail stores in order to start developing a brand of good quality vegetables at the respective retail stores. Such a strategy will contribute to a more consistent supply of good quality vegetables, and hence a reduction in some of the major transaction costs faced by the buyers when dealing with emerging farmers.
- Emerging farmers should guard against selling loads of vegetables of mixed quality to buyers who are also willing to buy vegetables of lesser quality (i.e. fresh produce markets). By selling good quality vegetables separate from vegetables of lesser quality will prevent the buyers to offer lower prices for the whole load due to the poor quality vegetables that are included in the load. By grading the vegetables before sending it to the buyers the farmers will ensure that good quality vegetables are sold together and vegetables of lesser quality are sold together.
- Farmers should guard against the negative impact of cultural activities on the performance of their farm businesses. Farmers who want to participate in cultural activities must ensure that the necessary activities on their farms are still performed. The biological nature of agricultural production suggests that the timing of certain activities is crucial. Farmers thus should be careful not to participate in cultural activities at the expense of their farm businesses.
- The nature of the constraints that typically exclude emerging farmers from participating in commercial agri-food chains suggests that farmers should keep an open mind with regard to the prospects of part-time farming as a mode of transition into commercial agriculture. Part-time farming exposes the farmer to additional human capital development activities, and decreases the dependence on farm profits for survival. Part-time farmers thus are more able to reinvest their profits in their farm businesses to grow their businesses.

POLICY RECOMMENDATIONS

The policy recommendations are discussed in two sections. The first section is concerned with policy recommendations to optimise water use along value chains, while the second section is more concerned with policies that will facilitate the successful participation of emerging farmers in commercial agri-food chains.

Policy recommendation related to water use in food value chains

- Policies that aim to facilitate compliance with the National Water Act (1998) have to be enforced to ensure that the farmers do comply. Ultimately, water resources need to be protected. Rather than supporting emerging farmers by not enforcing such policies, the focus rather should be to support the farmers to improve their performance to enable them to comply with such policies.
- Policies are required to incentivise all agents along a value chain to measure their water use as a first step towards increasing the degree of efficiency with which water is used along the chain. Price incentives for products that contain its water footprint on its label will incentivise the different role-players to ensure that water is measured at all of the different stages along the value chain.
- As the next step towards ensuring the efficient use of water, policies are required to incentivise all role-players to meet sub-sector water footprint benchmarks to ensure that water is used efficiently along the value chains. If incentives are correctly aligned, lead firms in value chains may contribute substantially towards ensuring the efficient use of water along the chain. Care should be taken to ensure that incentives are distributed fairly throughout the whole value chain to allow all agents to benefit from compliance. It has to be noted, however, that such an incentive may create a new stumbling block for emerging farmers who are known to be relatively inefficient. Buyers in commercial agri-food chains may be reluctant to deal with inefficient producers in order to access the incentive.
- Policies that will contribute to uplifting emerging farmers will also contribute substantially towards optimising the water that was used in value chains within which the emerging farmers participate by creating incentives for emerging farmers to use water more efficiently.

Policy recommendations related to uplifting emerging farmers

- Policies are required to facilitate government to meet its responsibility to provide emerging farmers with an enabling environment. A number of the stumbling blocks that contribute to the exclusion of emerging farmers from participating in commercial agri-food chains relate to the absence of an enabling environment. The performance criteria of the relevant governmental departments need to be adjusted to put more emphasis on meeting the

commitments. Sanctions for failure to meet the commitments need to be clearly specified and strictly enforced.

- Policies are required to facilitate the transfer of secure tenure to emerging farmers who operate on communal land. Secure tenure contributes to an enabling environment and also proves to contribute to farmers using their inputs more efficiently. Again, the performance criteria of the relevant governmental departments need to be adjusted to put more emphasis on the successful transfer of secure tenure to emerging farmers. Incentives for success and sanctions for failure need to be clearly specified and strictly enforced.
- Policies are required that incentivise commercial credit providers to develop financing products that are tailor made for emerging farmers. The very nature of being an emerging farmer normally excludes emerging farmers from having access to commercial credit. Access to credit will allow emerging farmers to supplement their cash flow, and hence to overcome a major stumbling block that contributes to the exclusion of emerging farmers from the formal market.
- Given the nature of emerging farmers in South Africa collective action has great potential to allow emerging farmers to benefit from economies of scale, and to reduce transaction costs faced by buyers who deal with emerging farmers. Policies are required to incentivise the establishment of collective entities among emerging farmers. The incentives, however, should not force farmers to establish an agricultural co-operative per se, but rather to establish an appropriate collective entity as a vehicle that will allow them to gain access to incentives through increased production of good quality produce.
- Policies are required to incentivise lead firms to enter into vertically coordinated relationships with emerging farmers. Incentives may include, i.e. tax benefits to organisations that can prove that they support and deal with emerging farmers thereby creating a complementary relationship between such organisations and the farmers. Government policies should not strictly recommend a specific type of relationship, but rather an appropriate type of relationship that will optimally benefit both parties. Once the appropriate type of relationship has been identified and instituted, the farmers are likely to also benefit from increased access to the necessary support and strategic market information as spin-offs from the relationship.
- Policies (i.e. price incentives) that incentivise emerging farmers to increase the production of good quality produce will also incentivise the farmers to improve the levels of efficiency with which they currently use their production inputs. It is, however, recognised that such incentives will mainly attract the attention of those farmers that exhibit relatively high levels of entrepreneurial skills. By creating a complementary relationship between emerging farmers and key role-players in their value chains the necessary support can be provided by private sector companies instead of governmental extension officers. Government then can focus its attention on creating and maintaining an enabling environment for the farmers.

- Policies are required to stimulate research and development in types of technology that will allow emerging farmers to also benefit from investments in research and development. The very nature of being emerging farmers (i.e. low levels of financial and human capital) means that emerging farmers typically do not exhibit the necessary means to adopt sophisticated new technology. While it is recognised that there is scope for research and development to focus on new technology, the focus of attention should be broader to allow emerging farmers to also benefit from investments in research and development.
- Policies are required to facilitate more effective extension and education. Extension and training are crucial to capacitate emerging farmers to increase the levels of efficiency with which they use their production inputs to produce agricultural products. Training sessions, however, have to specifically address challenges faced by the farmers in their day-to-day decision-making activities. Incentives and sanctions associated with the performance of extension officers and trainers should be clearly specified and enforced.
- Policies are required to incentivise part-time farming as a mode of transition from subsistence to emerging farming, and from emerging to commercial farming. Potential advantages of part-time farming include, amongst others, the fact that employees normally receive training that contributes to the expansion of their human capital; and part-time farming will also allow the farmer to reinvest profits into the farm business in order to enhance growth.
- The exit level strategy of any project that aims to support emerging farmers to improve their competitiveness to be able to participate sustainably in commercial agri-food chains has to be clearly specified and enforced to ensure that the farmers will be able to succeed on their own after the completion of the project.
- Government should refrain from dishing out production inputs to emerging farmers since it creates a culture of dependence. Instead, policies that allow emerging farmers to receive a price premium for good quality produce will incentivise the farmers to put in substantial effort to produce large volumes of good quality produce.
- Lastly, since the recommended policies relate to different governmental departments, it is recommended that there should be a high degree of coordination between the different governmental departments when implementing the respective policies that aim to facilitate the integration of emerging farmers into commercial agri-food chains. The nature of the stumbling blocks suggests that the successful participation of emerging farmers in commercial agri-food chains depends on all of the stumbling blocks being overcome simultaneously. Uncoordinated implementation of the different policies may mean that the farmers are unable to benefit optimally from the recommended policy changes.

RECOMMENDATIONS FOR FURTHER RESEARCH

The recommendations for further research is again divided into recommendations to optimise water use in value chains, and recommendations for further research to facilitate the linkage between emerging farmers and commercial agri-food chains.

Recommendations for further research related to water use in food value chains

- Research is necessary to determine benchmarks for sub-sector water footprints that can be used as a measure for success to incentivise role-players within agri-food chains to use water more efficiently. Benchmarks have to be identified for process water footprints at each stage along the value chain to ensure that role-players within each stage actively contribute towards the efficient use of water along the whole value chain.
- The reluctance of farmers (both emerging and commercial) to measure their water use in order to increase the level of efficiency with which they use water may be an indication of the failure of the institutions related to water use. Further research is necessary to determine the reasons for the failure of those institutions.
- For the purpose of this study the focus was to optimise the use of blue water along the value chains within which the emerging farmers from the respective case studies participate. Further research is necessary to optimise all types of water (green, blue and grey) that was used along the value chain. Optimal use of green water will decrease the need for blue water to produce the product. Similarly, minimising the degree of pollution along the value chain will minimise the need for fresh water that is needed to dilute the pollutants to acceptable levels (grey water). Since green and grey water affect the amount of blue water required, it is important to consider all types of water to really optimise water use along value chains.
- Given that the bulk of the water is used at farm-level, further research is necessary to increase the level of efficiency with which irrigation water is used at farm level. Care should be taken to ensure that technological advances are not for exclusive access to commercial farmers as is often the case with new technology. Emerging farmers too use substantial amounts of water while generating very poor returns from the water that is used. Consequently, the allocation of irrigation water to emerging farmers currently proves to be an inefficient allocation of the scarce water. Since it is recognised that irrigation farming has great potential to contribute to rural development, increasing the efficiency with which emerging farmers use irrigation water thus too deserves special attention in research. Further research is necessary to develop the appropriate technology that will allow emerging farmers to use water more efficiently.

Recommendations for further research related to uplifting emerging farmers

- The focus of attention of this study was to investigate key success factors that will contribute to the successful participation of emerging farmers in existing agri-food chains based on the assumption that the existing value chains are already competitive. Further research is necessary to investigate the potential to increase the degree of competitiveness of the respective value chains. Further research is also necessary to investigate different sub-sectors to identify those sub-sectors with good prospects for the successful integration of emerging farmers.
- Given that the bulk of the value is added in the secondary processing node while little of that value is distributed to the farmers, further research is necessary to investigate the scope for the farmers from Eksteenskuil to outsource the primary processing activity (which was proven not to be viable for farmers to integrate into) and then to vertically integrate into the secondary processing of raisins where raisins are used as ingredient in the baking industry.
- Further research is necessary to investigate the potential for emerging farmers to gain a sustainable competitive advantage in the commercial agri-food chains within which they are participating. Appropriate instruments need to be developed to give emerging farmers a competitive advantage when participating in commercial agri-food chains.
- Given the potential role to be played by leading firms in a value chain to support emerging farmers, further research is necessary to investigate the incentives and conditions that are required to convince such leading firms to get involved with groups of emerging farmers.
- Research is needed to assess the prospects of transforming communal tenure to individual tenure. The importance of the lack of title deeds as a central cause for the inability of the farmers to produce high volumes of good quality crops makes such research crucial at this stage.
- Research is also needed to assess the impact of the social dynamics of communal tenure and the way people organise themselves on the communal land on the prospects for transition from subsistence farming to emerging and commercial farming.
- The modelling of the optimal cash flow of the farmers in this study was based on the assumption that the farmers' sole objective is to maximise profit. By implication it was assumed that the farmers would use any gains in cash flow to increase production in order to increase their profits. Such an assumption is not necessarily justified. More research is necessary to better understand the decision making behaviour of emerging farmers. Agent Based Modelling may have some potential in this regard.
- Further research is also necessary to establish a development path that may facilitate the transition from communal farming to individual farming that will contribute to the emerging farmers sustainably participating in commercial agri-food chains. In this regard it is important to consider the different emerging farmer typologies to identify those typologies

that likely will be able to successfully move along a development path towards commercial farming.

- The potential of transitioning from communal farmers to individual farmers through the establishment of efficient land rental markets for emerging farmers also needs to be investigated. Given the challenge associated with the transfer of title deeds to individual farmers there may be scope for a rental market to secure tenure for individual farmers in the transition period. The rental market may even be sufficiently viable to decrease the need for transferring the title to all individual farmers.
- The role of part-time farming in the transition from communal farming to individual farming also needs to be investigated. Part-time farming may put less pressure on profit margins since the livelihoods of part-time farmers are not completely dependent on the income generated from their farm activities. Part-time farmers thus may be able to reinvest a larger proportion of their profits into their farms.
- A common occurrence within rural communities is the fact that the more dynamic members of the community leave the rural areas with the prospects to improve their livelihoods in the urban regions. Community members are also often reluctant to allow outsiders to enter their communities as new land users. Further research is necessary to investigate the impact of such social dynamics on land use in rural areas.
- Lastly, the developed net cash flow optimisation model needs to be extended to allow for proper modelling of the net cash flow of perennial crops over their entire lifespan.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

Poverty is a major cause for concern in South Africa. According to the United Nations Development Programme (UNDP) (2003), 48.5% of the South African population lives below the poverty line. Water Research Commission (WRC) (2008) argues that the only way in which an impact can be made to improve the livelihoods of the rural poor is by giving them access to available resources or assets in agriculture. The new democratic government of South Africa also recognises the role that can be played by agriculture in alleviating rural poverty as is evident from the prominence of agriculture in the National Development Plan (NDP) of the National Planning Commission (NPC) of South Africa and the Comprehensive Rural Development Programme (CRDP) that is implemented by the Department of Rural Development and Land Reform. According to the NDP (2011) agriculture (commercial and small-scale) has the potential to create about one million new jobs (direct and indirect) by 2030. NDP (2011) argues that the expansion of irrigated agriculture, supplemented by dry-land production where feasible, will be the driving force to meet the vision of the NPC for 2030 that South Africa's rural communities should have greater opportunities to participate fully in the economic, social and political life of the country. CRDP is part of government's plans to accelerate growth in rural areas. Essentially the programme aims to enable people living in the rural areas to use the natural resources at their disposal to become economically active (Republic of South Africa (RSA), 2009). Government is of the view that small-scale farmers can contribute significantly to the reduction of food insecurity (Molewa and Doidge, 2010). According to Backeberg and Sanewe (2010) agriculture contributes to economic development and rural livelihoods by providing food products, but it also represents a range of opportunities for earning income in production, processing, distribution and retailing phases of the food value chain. The role of agriculture thus extends the mere provision of food to rural communities. Emerging farmers are thus expected to have a major role to play in the alleviation of rural poverty in South Africa.

Rural development strategies are often based on increased productivity with the aim of ensuring higher production levels for direct consumption and for commercial disposal, thereby enhancing the generation of economic surpluses necessary for uplifting rural communities (Comprehensive

Africa Agriculture Development Programme of NEPAD, 2003). The food security approach (increased productivity) has dominated agricultural development interventions for the past 30 to 40 years whereby development projects, regardless of market access issues, have remained focused on increasing production of low value, staple food (Lundy *et al*., 2004). Although food security may be achieved through intensified agriculture, rural communities are often unable to gain the skills to take on the second step of finding and developing other supplementary income streams.

The recent shift away from national trade protection towards a free trade environment means that farmers need to alter their strategies, from a productivity approach, to a competitive approach. For farmers in developing countries, this means a radical shift from a strategy that relies upon so-called comparative advantages such as those gained by virtue of natural resources, cheap labour, state subsidies, and lightly processed products, which are easily duplicated by other zones or countries, towards a strategy of competitive advantage. This means that farmers within an enterprise need to understand how their markets operate, how their enterprise is positioned within a market chain and how that market chain can be organised to make it function more efficiently (Lundy *et al*., 2004). International development efforts have recognised these problems and are increasingly focused on the understanding of value chains with the aim to integrate farmers into competitive value chains (Magistro *et al*., 2004).

Since the beginning of democracy in South Africa in 1994, government has committed itself to working towards decreasing rural poverty through the implementation of policies that include initiatives to link emerging farmers to commercial agricultural value chains (Letsoalo and Van Averbeke, 2005). Government has also spent a large amount of money on research projects on ways to successfully link emerging farmers to commercial agri-food chains, and on the revitalisation of smallholder irrigation schemes (Denison and Manona, 2007).

1.2 PROBLEM STATEMENT

Despite the commitment from government and the huge investments made to help emerging farmers from smallholder irrigation schemes to be integrated into commercial agri-food chains, actual success stories where emerging farmers are successfully operating in commercial agri-food chains are scarce. The small number of success stories means that the objective to allow farmers to improve their livelihoods through irrigated agriculture is not met. It is noted that access to agricultural water plays a necessary role in increasing productivity, but access to water alone is not a sufficient condition to enhance productivity and alleviate poverty (Hussain and Perera, 2004). The farmers have to generate sufficient levels of income from their irrigation activities in order to alleviate poverty. The poor performance of the farmers despite all of the research may be an indication that the approaches to the research may be insufficient to get to

the core of the problem, and to allow the researchers to come up with workable solutions to overcome the problems.

1.3 OBJECTIVES AND DELIVERABLES

1.3.1 OBJECTIVES

The objectives of this study are as follows:

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Objective 1: To develop a conceptual framework based on a literature review on value chain analysis with specific reference to water utilisation and competitiveness in agriculture that encompasses (amongst others) understanding of:

- The concept of value chain analysis;
- Application of value chain analysis in agriculture;
- Contemporary challenges of local and global value chains;
- Approaches, methods and models available for analysis of the value chain.

Objective 2: To demonstrate the application of the conceptual framework for commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both) and to elaborate on how the suggested framework would generate solutions within the ambit of the rationale.

Objective 3: To determine the research approach, method and models for analysis of value chains with application to commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both).

Objective 4: To empirically analyse and model selected value chains in commercial and emerging agriculture in the horticulture and field crop industries (or a combination of both) with specific attention to (amongst others):

- Mapping of water use at critical points in the value chain;
- Optimisation of water use in the whole value chain;
- Mainstreaming of marginalised participants in the economy;
- Employment creation and poverty eradication;
- Improving competitiveness in the value chain.

1.3.2 SYNTHESIS OF DELIVERABLES

The objectives of the study were achieved through 22 different deliverables, including the draft final report, four annual progress reports and five annual capacity building reports.

Deliverables during the first year of the project were concerned with a review of literature on value chain analysis, with special reference to the different concepts of value chain analysis and the relevant applications of value chain analysis that would contribute to meeting the objectives of this study, and a report on the value chains that are to be analysed in detail as case studies. The deliverables during the second year of the study were concerned with the development of the conceptual framework that was used to analyse the respective value chains, a report on the approach and method for value chain analysis, and the first of three interim reports on data gathering and data analyses. More specifically, the interim report on data gathering and analyses covered a description of preliminary value chain maps in order to identify areas where more detailed data is required. During the third year two more interim reports on data gathering and analyses followed. With the first report governance structures were analysed to better understand the complex interrelations between market imperatives, opportunities and constraints at the different levels, and the power relations which influence how the value is distributed at the different levels. The second report presented the updated value chain maps to demonstrate the distribution of value and water use along the respective value chains. The report was also concerned with the stumbling blocks that contribute to inefficiencies, and potential leverage points that might contribute to overcoming the stumbling blocks. The deliverables in years four and five were concerned with three interim reports on the appropriate modelling of selected value chains, and the draft final report. The first interim report presented a conceptual model to optimise water use in agricultural value chains, followed by a description of the mathematical programming models that was used to optimise water use in the second interim report. The third interim discussed the results from optimising water use in the respective value chains. Two other deliverables are concerned with the distribution of the generated knowledge through scientific and popular articles.

1.4 METHODS OF ANALYSIS

In order to meet the objectives of this study, a comprehensive literature review was conducted to better understand the concept of value chain analysis and the different approaches that can be used for value chain analysis. Based on the literature review, a conceptual framework for the study was developed. This consists of an integrated New Institutional Economics (NIE) and a Structure-Conduct-Performance (SCP) framework. The application of the conceptual framework thus required both a NIE analysis, and a SCP analysis of the case studies. The integrated framework allows for a comprehensive analysis of the way in which the farmers behave and perform within their social, institutional and physical environment.

The conceptual framework was applied to three case studies: 1) raisin producers from Eksteenskuil in the Northern Cape Province; 2) vegetable producers from Zanyokwe Irrigation Scheme in the Eastern Cape Province; and 3) maize and vegetable producers from Thabina Irrigation Scheme in the Limpopo Province. The NIE analysis includes a comprehensive

analysis of the levels of social embeddedness (Level 1), institutional environment (Level 2), governance structures (Level 3), and resource allocation (Level 4). The analysis of the social embeddedness of the farmers contains a qualitative description of the culture, norms and traditions of the farmers that may influence their behaviour, and a compilation of a social capital index for each farmer. The analysis of the institutional environment is concerned with a qualitative description of the different rules and regulations that influence the way the farmers behave. A comprehensive analysis of the transactions between the farmers and their buyers is conducted in order to determine the optimal type of (vertical coordination strategy) governance structure to organise the transaction between the farmers and their buyers. Two decision-making frameworks then are used to recommend a vertical coordination strategy that best suits the characteristics of the transactions. The analysis of the level that is concerned with resource allocation consists of the analyses of different types of efficiency with which the farmers use their production inputs, using the Data Envelopment Analysis (DEA) technique. A distinction was made between a production and marketing sub-decision making unit (sub-DMU) in order to be able to determine the specific location of inefficiency. The different types of efficiency analyses include technical efficiency (the degree to which the farmers produced the maximum amount of output from their current input levels), allocative efficiency (the degree to which the farmers produced their current output levels at a minimum cost), economic efficiency (the degree to which the farmers were able to produce the maximum amount of output from their current input levels at a minimum cost), marketing efficiency (the degree to which the farmers were able to generate the maximum amount of income from the crops they produced), and overall efficiency (the degree to which the farmers were able to generate the maximum amount of income from the production inputs that they used). It is noted that for all types of efficiency analyses the farmers were benchmarked to each other. All recommendations are therefore within the technology set of the farmers.

The application of the SCP framework is concerned with a comprehensive analysis of the way the farmers behave in their physical environment. The analysis of the structure includes a qualitative description of the environment within which the farmers operate. The analysis of the conduct component contains a qualitative description of the way in which the farmers behave. The analysis of the performance of the farmers includes a description of the crop yields that were produced, and the income that was generated.

After the application of the conceptual framework to the different case studies, product flow maps were compiled to get an understanding of the flow of the physical product from the input supplier to the end consumer. The value chains were analysed in terms of the distribution of income to the different nodes along the value chain. The value chain maps were also extended to include the distribution of water use at each node to get an understanding of the total amount of water that was used to produce the product, and to deliver it to the end consumer. Based on the distribution of value and water use along the chains, the value of the water was

calculated at each node. The value of the water by the time the product left the farm was calculated as the gross margin per cubic meter of water that was used to produce the product. At the different nodes further downstream from the farm gate the value of the water was calculated as the value added per cubic meter of water. The total value of the water that was used to produce the product and to deliver it to the end consumer was calculated to determine which channel is associated with the highest value of the water.

After the value chain was analysed in terms of the distribution of the value of the water, a qualitative description of the value chain influencers and the value chain supporters to understand what are all the different rules and regulations that have to be met by the farmers who want to market their produce through the chain, and the available support structures that can help the farmers to comply with the rules and regulations.

Problem tree analyses were then performed to investigate the causes and effects of the major stumbling blocks that constrain the performance of the farmers, with the aim to identify potential solutions to overcome the stumbling blocks. After the problem tree analyses, a net cash flow optimisation model was used to model the potential impact of recommended actions.

1.5 ORGANISATION OF THE REPORT

Chapter One provides an introduction to the report by presenting some background to the study, the problem statement and objectives of the study, and also a brief summary of the methods used to meet the objectives.

The second chapter is concerned with a review of relevant literature to guide the authors for the purpose of analyses. The literature review is divided into two main sections. The first section contains a review of literature on the concept of value chain analysis and the different approaches for value chain analysis. The second section contains a review of literature of the different applications of value chain analysis. The aim was to get a comprehensive understanding of the concept of value chain analysis, the different approaches of value chain analysis that are available, and different applications of value chain analysis to guide analyses in order to be able to meet the research objectives.

The conceptual framework and methods of analysis are covered in Chapter Three. This starts with a description of the different levels of role-players that are to be considered in a value chain analysis. Then follows a discussion of the theoretical framework used to analyse the value chains under consideration, and the methods of analysis.

Chapters Four and Five contain two comprehensive case studies where the conceptual framework was applied to optimise economically beneficial water use towards the integration

of emerging and commercial farmers into the mainstream of the economy. Chapter Four contains the case study of raisin production and marketing by emerging raisin producers from Eksteenskuil, while the case study in Chapter Five is concerned with the production and marketing of vegetables by farmers from the Zanyokwe Irrigation Scheme. Due to data constraints, Chapter Six contains an exploratory study of the production and marketing of maize and vegetables by farmers from Thabina Irrigation Scheme.

Chapter Seven then concludes the report by presenting the conclusions drawn from the findings from the three case studies, and some recommendations for policy and further research.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The literature review is divided into two main sections. The first considers literature on the concept of value chain analysis, while the second contains a review of research where the concept of value chain analysis was applied. More specifically, when reviewing literature on the concept of value chain analysis, the idea is to get an understanding of the concept of a value chain, and to clarify which actors are to be considered within a value chain analysis. Thereafter the focus shifts to the different approaches of value chain analysis that are followed in practice in order to clarify the definition of a value chain as used in this study. The second section contains a review of related research where the concept of value chain analysis has been applied to the research questions posed in this study. More specifically, this includes studies conducted to assess the level of competitiveness of industries / value chains, research aimed at linking emerging farmers to markets, and research concerned with water use as products move along the chain from the input supplier to the end consumer.

2.2 VALUE CHAIN ANALYSIS

International development efforts have recognised the fact that farmers need to understand how their markets operate, how their enterprise is positioned within a market chain and how that market chain can be organised to make it function more efficiently (Lundy *et al*., 2004). Consequently, increased focus is placed upon understanding value chains with the aim to integrate farmers into competitive value chains (Magistro *et al*., 2004).

2.2.1 CONCEPT OF A VALUE CHAIN

A simple value chain describes a full range of the activities required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the inputs of various producer services), delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2000). Within a value chain in the real world, however, products move through respective links which may form part of

alternative value chains. Value chains in the real world are thus much more complex than the definition of a simple value chain (Kaplinsky and Morris, 2000).

USAID (2007) characterises the structure of a value chain in terms of five elements. The first element is the end market, which refers to the people who buy the product or service. USAID (2007) argues that the end markets of value chains determine the characteristics of the product, such as the amount and quality of the product to be produced, the timing of production, and the price to be charged for the product. The second element is the business and enabling environment. Amongst others, the enabling environment includes norms, customs, laws, regulations, policies, public infrastructure (i.e. roads and electricity) that determine the way in which the product or service moves along the value chain on its way to the end market. The third and fourth levels are concerned with vertical and horizontal linkages between actors in the chain. A vertical linkage refers to the relationship between actors at different levels along the value chain, while horizontal linkages refer to co-operation between different firms that perform similar functions in the value chain. The last element is concerned with the supporting markets. The supporting markets include all the support services (i.e. financial services, consulting, legal advice, etc.) that are key to firm-level upgrading. Within this structure a product or service needs to be moved from the input suppliers towards the end consumer.

A number of different approaches to value chain analysis can be identified in the literature. Some of these different approaches are discussed next.

2.2.2 DIFFERENT CONCEPTS OF VALUE CHAIN ANALYSIS

Over the years a number of different concepts have been used in other contexts that overlap with the concept of value chains (Kaplinsky and Morris, 2000). Some of those concepts include, amongst others, Porter's value chain, supply chain, global commodity chain, French *filière*, global production network, and commodity chain. Although the underlying concept of all of these approaches is similar, each has specific characteristics that distinguish it from the others. The different approaches are discussed next, with special reference to the major differences between the approaches.

2.2.2.1 Porter's value chain

Porter's value chain disaggregates a firm into its strategic relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation (Porter, 1985). Porter (1985) introduced the concept of a value chain in a quest for analysing the sources of competitive advantage within a firm. It is argued that a firm will gain a competitive advantage if it is able to perform the strategic activities at a lower cost, or cheaper

than competing firms. Porter's value chain is a basic tool to analyse a firm by systematically exploring all the activities performed *within* the firm, and the interactions between the activities (Romero and Tejada, 2011). Stamm (2004) argues that a limitation of Porter's value chain lies therein in that Porter limits himself to the level of the firm and corporate networks, while disregarding the aspect of corporate power (Stamm, 2004). Porter (1985), however, does recognise that a firm's value chain is embedded within a larger system of activities that comprise the value chains of other firms (suppliers upstream, and buyers downstream). While the concept of a value chain as used by Porter (1985) does focus on the firm, Porter (1985) introduced the concept of a value system to describe the system of value chains within which a firm operates that all contribute to moving the physical product towards the end buyer. It is argued that a firm's ability to gain and sustain competitive advantage depends both on the understanding of the firm's value chain, but also the way a firm fits in the overall value system. The approach of Porter thus allows for a comprehensive understanding of the value system within which a firm operates, but the focus of attention is also within the firm to identify activities that can contribute to a competitive advantage.

2.2.2.2 Supply chain

The term **supply chain** has also been used in the same context as that of a value chain. Although people tend to use these two terms interchangeably, strictly speaking a supply chain focuses upstream on integrating suppliers' and producers' processes and on reducing waste (Feller, Shunk and Calarman, 2006). On the contrary, value chains focus downstream on creating value in the eyes of the customer. Ramsay (2005), again, argues that the notion of a value chain may even be a misnomer since only resources move along the chain of linkages between firms – supplies going one way and money the other. Value on the other hand is a "meta-physical" perceived quality associated with the benefits that occur at the various points of exchange along the resource chain. Thus, while both terms are used interchangeably there is some evidence that neither is used correctly in the context intended.

2.2.2.3 Global commodity chain

Two approaches that have been widely used of late are the global commodity chain approach and the French *filière*. **Global commodity chain** analysis has been developed primarily for individual commodity chains (Raikes, Jensen, and Ponte, 2000). Its major contribution is its focus on the power relations embedded in value chain analysis. Gereffi (1994) showed that many chains are characterised by a dominant party who determines the overall character of the chain. Those dominant parties act as leading firms that become responsible for upgrading activities within individual links and coordinating interaction between the links. The role of the leading firm is referred to as that of "governance" (Kaplinsky and Morris, 2000). Gereffi (1994) furthermore distinguish between two types of governance structures based on the location

where the coordination is undertaken. Commodity chains in which coordination is undertaken by buyers are referred to as buyer-driven commodity chains, while structures where producers play the key role are referred to as producer-driven commodity chains. Gereffi (1994) furthermore identifies four dimensions of global commodity chains. The first dimension is the input-output structure of the chain, secondly the territory it covers, thirdly its governance structure, and finally the institutional framework that identifies how local, national and international conditions and policies shape the globalisation process at each stage in the chain (Raikes *et al.*, 2000). Of these four dimensions, the governance structure has received the most attention, since this is where the key notions of barriers to entry lies, where chain co-ordination appears in the analytical framework, and where the distinction between producer-driven and buyer-driven global commodity chain governance structures is introduced.

Although Raikes *et al.* (2000) conclude that the global commodity chain provides a fruitful platform for the study of globalisation and economic restructuring, they highlight a number of problems that remain to be solved. The first issue is with regard to several concepts that are defined too loosely to "bear the weight of theorisation imposed upon them". Secondly, they argue that although the distinction between a producer-driven and a buyer-driven global commodity chain may be useful as a general guide at the beginning of a project, it is unlikely that it can be used uncritically thereafter. They also argue that the global commodity chain approach needs to be adjusted for use in relation to flows of agricultural products since it has been developed in relation to industrial commodity chains. Finally, they argue that the concept of power needs to be further elaborated and qualified through empirical grounding in the global commodity chain approach.

2.2.2.4 French filière

The **French *filière***, on the other hand, is generally referred to as a "loosely-knit set of studies with the common characteristic that they are a *filière* (or chain) of activities and exchange as a tool and to delimit the scope of their analysis (Raikes *et al.*, 2000)". According to Stamm (2004) the main objective of the *filière* was to identify the flow of goods and the actors involved with the flows and to make them amenable to economic analysis. The simplest definition of *filière* thus largely corresponds to that of the production chain (Stamm, 2004). Based on its concern with quantitative technical relationships, the French *filière* is very similar to the concepts of value chains of Porter. The major difference, according to Raikes *et al.* (2000), however, is that the *flilière* approach makes no effort to work under a unified theoretical framework. Analysts employing *filière* rather borrow from different theories and methodologies.

Kaplinsky and Morris (2000) note that a major criticism of the *filière* is that it tends to be static in nature. By implication, it only reflects relations at a certain point in time (Kaplinsky and Morris, 2000). Stamm (2004), however, argues that this specific limitation of the *filière* has

been overcome of late since it was further developed through connections to various strands of theory. Ultimately, the *filière* obtained similar results to the new commodity or value chain approaches. Kaplinsky and Morris (2000) also state that *filière* analysis has generally been applied to domestic value chains. The *filière* approach has been used particularly to represent increasing differentiation and expansion in the food industry, where the *filières* are characterised by a rather straight-line process.

2.2.2.5 Global production network

The concept of **global production networks** was introduced by Henderson *et al.* (2001) and is a direct refinement of the global commodity chain. The major difference is that it addresses some of the weaknesses of the global commodity chain approach as have been discussed in recent years. The major adjustments made to the global commodity chain approach include the following (Henderson *et al*., 2001): Firstly, different actors in the chain may have different priorities with respect to profitability, growth, economic development, etc. Such differences in priorities may have distinct impacts on the behaviour of actors in the chain. Non-governmental organisations (NGOs) and labour unions are also systematically considered as actors in the development of an international value chain. Secondly, the input-output structures within the chains are considered highly significant since those structures ultimately decide on the locations where value and employment are created. Overall, the interrelations between the links of the chain and the place where they are embedded are the focus of interest. As stated by Henderson *et al*. (2001), “In order to understand the dynamics of development in a given place, then, we must comprehend how places are being transformed by flows of capital, labour, knowledge, power, etc. and how at the same time, places (or more specifically their institutional and social fabrics) are transforming those flows as they locate in place-specific domains”. Lastly the distinction between producer-driven and buyer-driven value chains is not retained in the global production network approach. Since power is still the heart of the analysis it is treated conceptually in a broader and more flexible manner. Henderson *et al*. (2001) distinguish between three forms of power: corporate power, institutional power, and collective power. Corporate power relates to the concept of governance in the global commodity chain approach. Institutional power, on the other hand, is the ability of government, supra-national, and global institutions to influence network relationships. Lastly, collective power relates to the possibilities for collective actors, above all, NGOs and labour unions, to influence the global production network.

2.2.2.6 Commodity chain

The last of the approaches which have been used over the years is the **Commodity Chain** approach. Commodity Chain Analysis is part of wider set of different approaches to chain analysis, including value chains and global commodity chains. Tallec and Bockel (2005) argue

that, although all of the above present broadly common aspects and can be associated to some extent, Commodity Chain Analysis is specifically targeted at agricultural commodities. Tallec and Bockel (2005) argue that the commodity chain is a particular way of dividing and presenting the system of production. It is an analytical concept and does not necessarily represent a type of organisation that would be found in the real world. The chain then is the implementation of a simple explicative model of the organisation of flows, and of the actors involved, which emphasises their interdependence and the regulatory framework within which they function (Tallec and Bockel, 2005).

Commodity Chain Analysis allows the analyst to identify the relationships between the different stages of transformation in the network of agricultural or agro-food systems. Tallec and Bockel (2005) argue that it "shows the synergies, the external effects, the co-operations, the influences and the strategic centres, the control of which ensures the dominance of certain agents; it constitutes the stage on which the strategies of the various actors are deployed." More specifically, Tallec and Bockel (2005) define a commodity chain to be the succession of operations and of agents which, starting upstream with a raw material, eventually emerge downstream, after several stages of transformation and increases in value, with one or more final products at consumer level. Tallec and Bockel (2005) conclude that a commodity chain is thus a series of operations of agents and of markets, which lead to physical flows and their counterparts in monetary values.

2.2.3 CONCLUSIONS ON THE REVIEW OF LITERATURE ON THE DIFFERENT CONCEPTS OF VALUE CHAIN ANALYSIS

From the above discussion of the different concepts of value chain analysis that were used over the years, one can conclude that most of the approaches are based on the same underlying aspect – the flow of the physical product, from input suppliers, to the final consumer. The major differences relate mainly to the focus of attention of the user. Given the descriptions of the different concepts of chain analysis, the concept of a commodity chain best resembles the type of chain analysis that is aimed for in this study. However, similar to the users of the French *filière*, the authors of this study do not make an effort to work under one single theoretical framework. The idea is rather to consider the useful aspects from all the different approaches to contribute to an in-depth analysis of the chain under consideration. Borrowing some of the useful aspects from the different approaches will contribute to a comprehensive understanding of the operations of the chain within which the emerging farmers are to be integrated.

Useful aspects from Porter's approach to value chain analysis include, amongst others, the fact that it considers the bigger system within which a firm operates while also allowing for a comprehensive analysis of the strategic activities that are performed within a firm. Thus, while

it is important to understand how the farm businesses within this study fit in their value systems, Porter's approach will also allow for disaggregating the farm businesses into strategic activities (i.e. production and marketing) to identify activities that can be improved to enhance the performance, and hence the competitiveness, of the farm businesses under consideration. Although the other concepts consider the farm business as a unit with the focus of attention on the way the business fits in the bigger system, they too contain useful aspects. The concept of a supply chain allows for a neat description of the flow of the physical product from the input suppliers to the end consumer, while the concepts of global commodity chains and global production networks focus the attention on the power relations within the chains. The global commodity chain concept focuses on the role of the leading firm within the chain (governance). Global production networks, on the other hand, allows for a more elaborated consideration of power within the chain by considering corporate power, institutional power, and collective power and its influence on the network (value chain system). Information regarding the power relations within the chains that are considered in this study is important due to the influence of such powers on the behaviour of the actors within the chains. The French *filière* approach shows that it is not really necessary to choose only one approach to analyse a chain, but rather it may be worthwhile to consider the useful aspects from all of the other approaches that will contribute to an in-depth analysis of the chains under consideration.

Concepts related to the concept of a value chain have been widely applied by researchers from different fields of research over the years. The next section covers a review of some of those applications that are relevant for the purpose of this study.

2.3 APPLICATION OF VALUE CHAIN ANALYSIS IN AGRICULTURE

Value chain analysis is used for a wide variety of applications. According to Webber and Labaste (2010), the value chain approach "is being used to guide and drive high-impact and sustainable initiatives focused on improving productivity, competitiveness, entrepreneurship, and small and medium enterprise (SME) growth". The different applications that are relevant for this research are the use of value chain analysis to assess the level of competitiveness within the value chain, to identify a possible link for emerging farmers to integrate with the mainstream economy, and also to assess the impact of water use on alternative land uses. Some recent studies that have used value chain analysis for the above applications are discussed next.

2.3.1 ASSESSMENT OF THE LEVEL OF COMPETITIVENESS OF A CHAIN

Value chain analysis is often used to assess the level of competitiveness within an industry. According to Schmitz (2005), the quality of domestic linkages and domestic support systems within a chain play a critical role in creating international competitiveness. Thus, for a chain to

be competitive internationally an effective domestic chain is required. With regard to an effective domestic chain, Schmitz (2005) argues that such a chain means that suppliers need to provide on-time delivery of high quality inputs, as well as support institutions that can test the quality of the inputs and certify conformance with international standards.

2.3.1.1 International research concerned with the competitiveness of agri-food chains

The importance of using the value chain analysis approach to contribute to enhancing the level of competitiveness of an industry is evident from the number of studies, including those by Webber and Labaste (2010), FIAS (2007), Lusby and Panlibuton (2007), Fundira (2003), and Neves *et al*. (undated), which compiled guides and research frameworks to enhance the level of competitiveness of the industry under consideration. Other researchers have also applied value chain analysis to investigate the competitiveness in a variety of industries, including agricultural industries. Studies that investigate the competitiveness in agricultural industries include, amongst others, Fitter and Kaplinsky (2001) who investigated power asymmetries in the coffee value chain, Neves *et al*. (undated), who assessed the whole orange industry in Brazil, and Francis (2004), who investigated ways to improve the efficiency of the UK red meat industry. These studies are discussed in more detail in this section.

Webber and Labaste (2010) compiled a guide to value chain concepts and applications with the aim to build competitiveness in Africa's agriculture. The guide is based on the notion that value chain enhancement is an effective approach to reduce rural poverty in sub-Saharan Africa. Within the guide Webber and Labaste (2010) emphasise the importance of value chain based approaches for the development of agro-enterprise and agro-food chains in sub-Saharan Africa. The guide also emphasises the principles of market focus, partnering, collaboration and information sharing, and innovation (Webber and Labaste, 2010). Webber and Labaste (2010) use concrete examples as case studies to present, review and systematically illustrate concepts, analytical tools and methodologies that can be used to design, prepare, implement, assess and evaluate agribusiness development initiatives. They argue that the value chain perspective "provides an important means to understand business-to-business relationships that connect the chain, mechanisms for increasing efficiency, and ways to enable business to increase productivity and add value", and hence can contribute to pro-poor initiatives and better linking of smallholder farmers to markets.

Foreign Investment Advisory Service (FIAS) (2007) provides an analytical framework that can be used to assess the performance of a value chain as the basis for identifying factors that constrain growth and the competitiveness of the value chain. The idea is to contribute to policy and programmes that may contribute to overcoming the identified constraints. FIAS (2007) argues that the value chain analysis framework allows for the identification of the issues that constrain competitiveness, whether it is sector specific, or whether it applies to the entire

economy. After developing the framework, FIAS (2007) demonstrates its use by applying the framework to the case of Nigeria's shrimp industry and Mozambique's tourism industry. It is argued that Nigeria's shrimp industry faced a turnaround after it entered a global value chain by exporting shrimp to the EU. In that sense, the Nigerian government was "influential in fostering growth in its shrimp industry through effective policy implementation to acquire the HACCP certificate" (FIAS, 2007). In the case of Mozambique's tourism industry the application of the framework identified a number of stumbling blocks that constrain the competitiveness of the industry. After using the value chain analysis framework it was possible to develop targeted policy recommendations that were aimed at addressing the key areas of constraints in the industry.

Lusby and Panlibuton (2007) also developed an approach to enhance the competitiveness of an industry. Their approach attempts to "combine the strengths of value chain analysis with the promotion of sustainable, market-based solutions that respond to the recurrent needs of micro, small, and medium enterprises" (Lusby and Panlibuton, 2007). Value chain analysis is used in the framework to gain an understanding of the context within which market players operate within the chain, and to gather information on the roles of the market players, as well as the interrelationship between the players. Again the focus is on potential constraints that may hinder the growth and competitiveness of the value chain. After identifying the constraints, the focus of the framework shifts to the identification, and assessment of the feasibility, of potential solutions. The last stages of the framework allow for the identification and selection of interventions that may contribute to implementing feasible solutions. Lusby and Panlibuton (2007) argue that their approach provides a method to prioritise potential solutions in terms of the impact they will have on the value chain and market players, and it also is "conducive to strengthening linkages and mutually beneficial relationships between market actors".

Another study that employs value chain analysis in relation with competitiveness is the study by Neves *et al*. (undated). They provide a framework for mapping and quantifying food and agribusiness chains with the main aim of identifying a number of collective actions that should be implemented by the private sector and government. They note that the co-operation in vertical chains is well covered in the literature. Neves *et al*. (undated) apply their developed framework to study the whole orange network in Brazil. As the first step they study the network by identifying the main companies and numbers starting from the agents that supply inputs for farmers' production, to the distribution to final consumers. Doing that, they obtain a general picture of the citrus network within Brazil. Then in the next step they try to bring all the role players together in some actions that can bring positive results to the whole network. After a workshop with the role players, a private committee was created that will meet periodically in order to do a marketing plan for the whole network. They also will continue with discussions on the use of common actions which should result in common benefits. Neves *et al*. (undated) conclude that there is some evidence that some of the agents in the chain have already

understood the importance of establishing conjoint strategies that will benefit everyone. In that regard a good relationship between the different actors is of the utmost importance since they need to view each other as partners in order to develop integrated actions to improve the whole system.

Fitter and Kaplinsky (2001) uses value chain analysis to identify power asymmetries within the coffee value chain. They found power within the chain to be distributed asymmetrically. In producer countries the power is very weak since farming is highly fragmented and also due to the destruction of marketing boards, which further reduces the capacity of farmers to raise their share of value chain rents. On the other hand, there are three major residues of power at the importing end of the chain. There are the importers, roasters and retailers. Although they compete with each other for a share of value chain rents, they collaborate with each other to ensure that as little as possible of the rents return to the farmer or producer countries. From the results of their study, Fitter and Kaplinsky (2001) conclude that there is a definite process of power concentration in importing countries while there is power deconcentration in coffee producing countries. Fitter and Kaplinsky (2001) finally conclude by hypothesising that similar trends may be possible in other agricultural value chains.

Francis (2004) performed a value chain analysis of the United Kingdom (UK) red meat industry with the aim to improve the efficiency of the chain. Based on the results of the study Francis (2004) made a number of intra- and inter-firm recommendations with regard to waste elimination. A number of those recommendations were already in the process of being implemented by the time of publication. Amongst others, Francis (2004) found that approximately 20% of the steaks that are ordered by end consumers in the restaurant were not cooked as requested. Such a finding has resulted in the development of a “new control metric to help reduce the variability of this key aspect of restaurant performance and better coordinate and control activities of the supply chain and customer-facing teams within the organisation” (Francis, 2004). Some other performance measures that were also identified include shelf availability, finished product waste, carcass conformation, carcass balance, and demand amplification. Francis (2004) cites Towill (1997) who states that the above mentioned measures are planned to be shared amongst respective members in the chain to enhance transparency and to attempt to instigate a seamless supply chain.

2.3.1.2 South African research concerned with the competitiveness of agri-food chains

Within the South African context, a number of studies have investigated the level of competitiveness of different agricultural industries. Researchers have mainly used Porters’ Diamond to investigate potential success factors that may contribute to enhancing the level of competitiveness of the industries. Researchers who have applied Porter’s Diamond within the South African context include Boonzaaier (2009), Madevu, Louw, and Kirsten (2007), Madevu

(2006), and Esterhuizen, Van Rooyen, and D'Haese (2001). Other studies that investigated the competitiveness of agricultural industries in South Africa include the studies by Fundira (2003), and Hardman, Darroch and Ortmann (2002). Fundira (2003) investigated the competitiveness of the South African table grape industry, while Hardman *et al*. (2002) investigated ways to enhance the level of competitiveness of the apple export industry. The last application considered for the purpose of this study is the study by Darroch and Mushayanyama (2008), who investigated ways to enhance the level of competitiveness of a group of emerging farmers who operate collectively as the Ezemvelo Farmers' Organisation (EFO).

Boonzaaier (2009) developed a framework that can be used to improve the level of competitiveness of resource poor farmers in South Africa. The framework uses value chain analysis to identify role-players (i.e. potential partners and markets) in the chain, after which the current level of competitiveness of the farmers is assessed using the production cost method. Porter's Diamond is used to identify key success factors that may contribute to improving the level of competitiveness of the farmers. A strategy then is developed based on the key success factors, and the role-players that were identified in the value chain analysis that may contribute to improving the level of competitiveness of the farmers. The last step of the framework is the refinement of the strategy based on the buy-in and commitment of farmers, and the implementation of the refined strategy. Boonzaaier (2009) applied the developed framework to a group of small-scale farmers in the Philippi horticultural and surrounding areas of the City of Cape Town. Although the recommendations had not been fully implemented by the time of writing up his study, Boonzaaier (2009) argues that the framework did contribute to identifying key success factors and potential stake-holders willing to assist the emerging farmers in order to improve their competitiveness.

Madevu (2006) and Madevu *et al*. (2007) employ Porter's forces model to analyse the competitive situation by determining relative competitive and strategic behaviour of retailers. More specifically they look at the fresh fruit and vegetable channels for informal traders (hawkers), greengrocers, and supermarkets. Both Madevu (2006) and Madevu *et al*. (2007) aim to identify potential upgrades in the respective sectors. From their research they found that tri-dimensional competition was the most intense in the middle-income areas of Tshwane. The low income areas were dominated by informal traders while the large supermarket chains and large format greengrocers dominated the high income areas. Other interesting findings by Madevu (2006) when comparing the value chain maps of the three marketing strategies were that tri-dimensional competitive environment was facilitated by the existence of multiple niches, the equalising effect of produce market based pricing, the general upgrade in product quality offered by all retailers, the characteristics of fresh produce itself as compared to other foodstuffs, and the mere existence of multiple market niches in the sector. With regard to the potential upgrades, Madevu *et al*. (2007) emphasise the need to obtain hawkers' licences.

They also argue that informal traders miss the opportunity to collaborate with each other to increase their lobbying power. Groups have the potential to gain better terms of trade such as better prices and also assist with lowering transaction costs to training and other services. Madevu *et al*. (2007) also suggest that cellular technology should be used to increase access to market information such as data on prices, supply and demand trends.

Esterhuizen *et al.* (2001) apply Porter's model to investigate the determinants of competitiveness in the South African agro-food and fibre complex. The distinction was emphasised between factors over which agribusiness has relatively little control (i.e. labour regulations and costs, crime, quality of physical infrastructure), and factors that firms have a large degree of control over (i.e. product quality, cost of production and managerial capacity and labour skills). According to Esterhuizen *et al*. (2001), a firm level strategy to improve competitiveness should first focus on those aspects over which a firm has control. They argue for increasing levels of supply chain management to ensure that the relationships between buyers and sellers within the chain can be managed more productively; joint ventures with the research and development and the technology industries to ensure that firms get access to expensive technology; and for long-term contractual pricing to replace short-term spot market pricing. With regard to the external factors that firms have no control over, Esterhuizen *et al*. (2001) argue for a more focused Agribusiness Development Policy to "provide a more favourable environment for firms in the agro-food and fibre complex to perform more competitively."

Darroch and Mushayanyama (2008) investigate ways to improve the competitiveness of the supply chain of the Ezemvelo Farmers' Organisation (EFO). The focus of their research was on the relationship between the packhouse agent and the members of EFO. The reason for focusing on that relationship was that the agent was instrumental in establishing and coordinating the supply chain. With regard to the relationship, they more specifically consider the levels to which the members of EFO are satisfied with the working relationship, have trust in the working relationship, and co-operate actively within the relationship. Darroch and Mushayanyama (2008) find that EFO members who have higher levels of satisfaction with the packhouse agent also have higher levels of trust in the relationship. In turn, the higher levels of trust contribute to higher levels of commitment, which together lead to higher levels of co-operation. A two-way relationship was identified between co-operation and commitment of the members of EFO. When investigating the potential constraints on the competitiveness of the supply chain, Darroch and Mushayanyama (2008) identify a number of key issues that need to be addressed when aiming to improve access to and the competitiveness of supply chains that exist in rural areas. Such issues include "choice of appropriate products; location-specific agro-ecological conditions; labour and other location-specific input constraints; the need for institutional innovations; lack of smallholder marketing orientation; the need for clearly defined

and enforced contract trading terms to foster trust; co-operation and commitment and reduce transaction cost; and long-term commitment by all players in the supply chain."

Fundira (2003) examines the supply chains for table grapes and citrus in South Africa. The aim of the study was to identify inefficiencies along the chain that results in transaction costs. The existence of transaction costs reduces the net price that sellers receive and increases the net price buyers have to pay for the product. Thereby a wedge is driven between the equilibrium prices for the buyer and the seller. Identification of inefficiencies along the chain allows Fundira (2003) to provide recommendations for the reduction of transaction costs in the industry which ultimately may lead to higher profits than are currently achieved. Fundira (2003) finds information asymmetry to have a negative impact on the efficiency of both the citrus and the table grape industries. Information asymmetry allows for opportunistic behaviour by agents along the chain who possess information that others do not. Another cause of opportunistic behaviour is the high level of asset specificity that is associated both with citrus and table grape production and marketing. From the literature, a mitigating action against high transaction cost may be a higher level of vertical integration. Fundira (2003) however recommends that exporters rather investigate the use of production contracts instead of "venturing into full vertical integration". The production contract as recommended by Fundira (2003) relates very much to the hybrid form of governance described by Williamson (1985). As a conclusion to his study, Fundira (2003) recommends that bilateral contracting and strategic alliances should be given priority to enhance effective communication, commitment and collective decision-making.

Hardman *et al.* (2002) investigated how the South African apple producers, packers, and exporters can improve their level of co-operation in order to address constraints that prevent the export chain from being more competitive internationally. Using a recursive Ordinary Least Squares model, they found that the role-players in the apple export value chain need to improve their co-operation with regard to production planning, delivery scheduling, and quality control in order to enhance their competitiveness.

2.3.2 LINKING EMERGING FARMERS TO THE MAINSTREAM ECONOMY

One of the major constraints faced by emerging farmers all over the world is lack of market access. Value chain analysis is also used to help producers gain market access (Schmitz, 2005). Although Schmitz (2005) does not refer explicitly to emerging farmers, value chain analysis proves to be useful for identifying points along the chain where emerging farmers can access the market and hence link with the mainstream economy. The next two sections cover a brief discussion of international and local studies where value chain analysis is used with the aim of integrating farmers into markets.

2.3.2.1 International research on linking farmers to markets

Value chain analysis is often used to identify ways by which small-scale farmers can be integrated into global value chains. International studies that use value chain analysis to identify possible links where emerging farmers can join the mainstream economy include, amongst others, the research conducted by the Regoverning Markets programme (Regoverning Markets, 2006), and studies by Schipmann (2006) and Van der Meer (2005).

The Regoverning Markets programme is a major contributor to the body of literature on linking farmers to markets. The Regoverning Markets programme recognises that small-scale agriculture is poorly prepared for the rapid changes that are taking place in the agri-food markets in middle and low-income countries. The overall aim of the Regoverning Markets programme is to provide strategic advice and guidance to all role-players on approaches that can anticipate and manage the impact of dynamic changes in local and regional markets (Regoverning Markets, 2011). Through collaborative research, the programme aims to get an understanding of the key aspects that affect inclusion in agri-food markets. Special emphasis is placed on implications and opportunities for small-scale producers, and the best means for linking small-scale farmers to dynamic markets. The programme aims to bring their findings into the policy arena in order to recommend practical action, public sector policy and private sector strategies (Regoverning Markets, 2011) that may contribute to the successful integration of small-scale farmers into dynamic markets.

Schipmann (2006) uses value chain analysis to identify ways to better integrate smallholders into value chains. More specifically, Schipmann (2006) compares international and national value chains in terms of the potential benefit for smallholders and to identify existing barriers to entry that constrain smallholders in joining the specific value chain. On the one hand, it was found that although the benefits are higher within the export channel, the export channel is also associated with higher barriers to entry. On the other hand, when distinguishing between the alternative national value chains and comparing all of those to the more beneficial export channel, Schipmann (2006) finds that there actually is a national chain that earns a higher income than the export chain. This channel again, however, has even higher barriers to entry for smallholders than the export chain. Schipmann (2006) concludes finally that the difference between export and national markets is thus not the decisive distinction for possible benefits and entry barriers, but rather it is the final product that is supplied. Schipmann (2006) also finds a strong correlation between the complexity of the final product and the governance structure, and also between the governance structure and the benefits and entry barriers for smallholders. The more complex and the higher the quality of the final product, the stronger is the relationship between producers and traders. Furthermore the stronger the relationship between producers and traders, the greater are the benefits that accrue to the smallholders.

Van der Meer (2005) argues that the integration of producers and consumers in deepening and broadening markets is a crucial characteristic of development. Van der Meer (2005) recognises that a lot of effort is placed on identifying ways to link small-scale producers to markets. Van der Meer (2005) discusses various factors that may be of importance when designing practical interventions. Amongst others, Van der Meer (2005) reckons buyers' preferences, the characteristics of the country, market outlets, the specific product and supply chain, the nature of the product, commercial strategies and the market segments are important issues to consider. Van der Meer (2005) argues that in markets with low requirements, private investment in supply chain organisation is in general not possible as the gross value added is generally lower that the necessary transaction costs. Contract farming arrangements by monopsonic buyers, however, may be the only exception. Although the public sector often plays a major role in improving small-scale producers' access to markets, Van der Meer (2005) emphasises that public sector intervention should be based on ways to mitigate market failure, to achieve net benefits and also to improve livelihoods. The emphasis of improvements should focus on the reduction of transaction costs, securing minimum food safety and improving on-farm technology. In markets with moderate requirements, private investment may be feasible (Van der Meer, 2005). By implication it means that the formation of coordinated supply chains may be feasible especially in the case of monopsonic power, or in the case of sharing value added among chain partners. In this sense, public interventions could target support for the formation of coordinated supply chains through process facilitation, improvement of the investment climate, reduction of transaction cost and risk (Van der Meer, 2005). Finally, for markets with high requirements, Van der Meer (2005) argues that returns from investment in coordinated supply chains will be higher than the transaction cost. Coordinated supply chains are thus a common feature in this market segment.

2.3.2.2 Linking emerging farmers from South Africa to markets

The topic of linking emerging farmers to markets is well researched within South Africa. Ortmann and King (2010) conducted a review of such research in Southern Africa and found no fewer than 31 articles published only in *Agrekon* during the past decade. Although these articles include studies conducted in Southern Africa (with special emphasis on South Africa) it is important to note that Ortmann and King (2010) only considered the research that was published in Agrekon. In addition to the volume of research already published in the past decade, the past five years has seen at least two PhDs (Cloete, 2010; Magingxa, 2006) and five Masters degrees (Khaile, 2012; Van der Merwe, 2012; Baloyi, 2010; Van der Heijden, 2010; Boonzaaier, 2009) that were obtained in the general field of linking farmers to markets within South Africa.

The reason for the large volume of research that is being done on this topic is the fact that the South African government has paid greater attention by means of research and extension

efforts to promote the growth of emerging small-scale farmers with the aim to promote food security to the rural poor (Ortmann and King, 2010). Ortmann and King (2010) also state that non-governmental organisations and researchers at universities have invested considerable resources to investigate practical ways of linking emerging farmers to mainstream agri-food chains. Such investments seem justifiable given the fact that NDP (2011) specifically lists linking small-scale farmers to markets as one of the recommendations to meet the vision that, by 2030, South Africa's rural communities should have greater opportunities to participate fully in the economic, social and political life of the country.

For the purpose of discussion, this section is divided into research that identifies constraints that contribute to the exclusion of emerging farmers from commercial agri-food chains, and research that reports on success stories where emerging farmers are successfully participating in commercial agri-food chains.

2.3.2.2.1 Factors constraining emerging farmers in South Africa from participating in commercial agri-food chains

The main factors that constrain emerging farmers from participating in commercial agri-food chains are centred around their inability to consistently produce a sufficient volume of good quality produce. Emerging farmers find it difficult to supply formal markets due to their stringent requirements. Louw *et al*. (2008) cite IIED (2004), who mentions that domestic markets in liberalised economies increasingly have more in common with the export markets in terms of grades, standards, business practices, prices and ownership. According to Bienabe and Vermeulen (2007), most of the major retail stores within South Africa require internationally recognised food quality and safety systems at farm level (EurepGAP), and at packhouse / processing level (HACCP). The implementation, maintenance and auditing of the safety systems are complex, time-consuming, and expensive, which contributes to the difficulty faced by emerging farmers to supply such retail stores (Bienabe and Vermeulen, 2007).

In addition to the quality requirements, emerging farmers generally are unable to assure a consistent supply of the required volumes of produce. Baloyi (2010) found that some of his respondents have participated in formal markets in previous year, but contracts were cancelled due to the inconsistency of the volume and quality of supply. The buyers of agricultural produce in principle have no problem with procurement from emerging farmers. Baloyi (2010) actually interviewed some of the buyers of fresh produce in the Limpopo Province to determine their willingness to procure fresh produce from smallholders. The interviewed buyers include retail stores, a fresh produce market, and a potato processing company. All of the interviewees indicated that they would be more than willing to procure from smallholder farmers if they comply with quality standards and consistency of delivery. Such a finding echoes the argument by Vermeulen *et al*. (2008), as cited by Van der Heijden (2010), that the buyers of agricultural

produce may generally be viewed as being objective and neutral market agents who have a vested interest in working with reliable producers as partners. Their focus is only on getting a sufficient volume of good quality produce to be able to efficiently service their consumers.

The factors that contribute to the inability of emerging farmers to consistently produce a sufficient volume of good quality produce are well documented in the literature. Those include the small scale of operations, insecure property rights and the consequent lack of access to credit, high levels of transaction cost (including poor condition of physical infrastructure, lack of market information and trust amongst actors, and dispersed production by emerging farmers), and the lack of support structures to assist farmers in meeting the stringent requirements. Those constraints are discussed below in more detail.

- **Small scale of operations**

The scale of operations of emerging farmers is typically very small, which means that they have no bargaining power to negotiate for better prices when purchasing inputs or when selling their produce (Van der Heijden, 2010). Emerging farmers are also not able to benefit from economies of scale. A number of researchers, including Khaile (2012), Baloyi (2010) and Ntsonto (2005), found that the average farm size of emerging farmers was less than five hectares. Baloyi (2010) analysed the constraints faced by smallholder farmers in the agribusiness value chain with special focus on two districts in the Limpopo Province. Khaile (2012) investigate the technical efficiency of emerging raisin producers at Eksteenskuil in the Northern Cape Province. Ntsonto (2005) assessed the performance of smallholder irrigation schemes focusing on Zanyokwe Irrigation Scheme in the Eastern Cape Province. Perret (2002) and Matungul, Lyne and Ortmann (2001) found even smaller average farm sizes in their study areas. Matungul *et al*. (2001) examined the characteristics of smallholder households in Impendle and Swayimana in rural KwaZulu-Natal and found the average sizes of plots allocated to farmers to be 1.1 ha in Impendle and 1.8 ha in Swayimana. Perret (2002) compiled a typology of existing irrigation schemes in South Africa and found that the average farm size per beneficiary ranges between 1.3 ha and 1.7 ha. Interesting to note from the above studies is that the small size of farms is not restricted to certain provinces within South Africa. The small size of farms is a typical problem faced by emerging farmers throughout South Africa.

The impact of farm size on the marketing behaviour of smallholder farmers has also been investigated by some authors, including Randela, Alemu, and Groenewald (2008) and Masuku, Makura, and Rwelamira (2007). They found that the size of land cultivated affects farmers' marketing decisions. Randela *et al*. (2008) found that the size of land significantly influences the degree of market participation of small-scale cotton producers in Mpumalanga. Masuku *et al*. (2001) found that farm size has a significant influence on smallholder maize

farmers' choice of marketing channels in Swaziland. Given the small size of land that is available to emerging farmers for production purposes in South Africa, it is understandable that individual farmers struggle to meet the requirements of buyers in the formal market in terms of the consistent supply of a sufficient volume of produce.

- **Insecure property rights**

Within South Africa, a major factor constraining emerging farmers from participating in commercial agri-food chains is centralised around the lack of secure property rights (Ortmann and King, 2010; Baloyi, 2010). The insecurity in property rights for emerging farmers stem from the political history in South Africa. White governments in the 19th and 20th centuries actively marginalised black farmers through legislation that viewed land to be an asset exclusively controlled by white authorities (Rudman, 2009). Under the apartheid regime black farmers were forced into homelands (Centre for Development and Enterprise (CDE), 2005) where communal land was held in trust for Africans by the South African Bantu Trust. The occupation of land where Trust tenure applies is principally based on the Permission to Occupy (PTO) system (Manona *et al*., 2010; Weideman, 2004). The responsibility of land allocation often lies with tribal authorities hence households cannot claim formal ownership of the allocated pieces of land (Matungul *et al*., 2001).

Although a number of different policies were introduced since 1994 to contribute to securing tenure (Tlou *et al*., 2006), the issue of insecure tenure remains to be a problem. None of the farmers within the two study areas covered by Matungul *et al*. (2001) had formal ownership of their allocated pieces of land. Khaile (2012) also found that only a few (less than 29%) of the Eksteenskuil raisin producers have the title deeds for the land they cultivate. At Zanyokwe Irrigation Scheme, Ntsonto (2005) found that 44% of the farmers do have freehold tenure of their land. Although this is substantially higher than findings by Matungul *et al*. (2001) and Khaile (2012), it still is low, being less than 50%. Not having formal ownership of their land has some major implications for those farmers who are cultivating the land. Farmers who do not have formal ownership of their land cannot use the land as collateral to obtain credit to buy production inputs; have a disincentive to invest in improvements on the land; and are unable and without any form of incentive to rent unused arable land (Matungul *et al*., 2001).

- **Lack of access to credit**

The lack of financial capital is a constraint that is typical of emerging farmers from South Africa and is a major contributor to them being excluded from participating in commercial agri-food chains (Van der Heijden, 2010). Sartorius and Kirsten (2007) argue that small-scale farmers in developing countries who want to produce products that meet the requirements of modern markets need access to a range of production inputs, as well as the necessary financial means

to purchase those inputs. A number of studies, however, including those of Baloyi (2010) and Khaile (2012), have found that few emerging farmers from South Africa have access to credit to finance the necessary production inputs. Baloyi (2010) found that few of the farmers from the two study areas in Limpopo Province have access to modern production inputs since they do not have access to credit. Khaile (2012) too, found that few (less than 40%) of the raisin producers from Eksteenskuil to have access to credit and hence access to the required production inputs. Khaile (2012) found a positive relationship between access to credit and the level of technical efficiency of the raisin producers at Eksteenskuil. The findings by Khaile (2012) thus confirm the notion that the lack of access to credit contributes to emerging farmers being excluded from participating in commercial agri-food chains due to insufficient production volumes.

The lack of secure property rights thus has a major impact on emerging farmers' ability to participate in competitive commercial agri-food chains. It is important to thoroughly assess the security of property rights when aiming to integrate emerging farmers into competitive commercial agri-food chains.

- **High transaction cost**

One of the major contributors to the exclusion of emerging farmers from participating in commercial agri-food chains is the high levels of transaction cost faced by emerging farmers (Matungul *et al*., 2001; Wynne and Lyne, 2004; Randela *et al*., 2008). The role of transaction cost in marketing behaviour has been extensively researched in the last decade as is evident from the review by Ortmann and King (2010). Factors that contribute to higher levels of transaction cost include poor conditions of physical infrastructure, lack of trust among value chain participants, lack of market information, and distance to the market.

- **Poor conditions of physical infrastructure**

A major contributor to the higher levels of transaction cost faced by emerging farmers relate to the poor condition of the physical infrastructure in the rural areas. The road infrastructure (Matungul *et al*., 2001; Ortmann and King, 2007; Jari and Fraser, 2009; Baloyi, 2010; Van der Heijden, 2010), telecommunication and transport infrastructure (Matungul *et al*., 2001) in the rural areas typically are in a poor condition. There is usually a lack of access to electricity that is needed to operate coolrooms and packhouses (Van der Heijden, 2010), hence the majority of smallholder farmers do not have access to cold rooms or pack houses to keep harvested produce fresh till it reaches the market (Baloyi, 2010). Lastly, market facilities are often either in a poor condition or even non-existent (Van der Heijden, 2010).

- **Lack of trust among value chain participants**

Another contributor to transaction cost faced by emerging farmers relates to the lack of trust among the actors involved in the transactions within the value chain. Agri-food systems are changing in response to the global forces of globalisation and liberalisation which have led to "new kinds" of consumers and producers (Louw, Kirsten and Madevu, 2005). Van der Heijden (2010) cites Vermeulen *et al*. (2008:3), who argue that the buyers of agricultural produce can generally be viewed as being objective and neutral market agents who are interested in working with reliable producers to ensure that they meet the requirements of the new kind of consumers. The buyers need to have trust in the ability of the producers to allow them to meet the requirements of the new kind of consumers. The importance of trust in the relationship is also echoed by Albu and Griffith (2006:17) who state that "mistrust and misunderstanding between actors" are major contributors to the exclusion of small-scale farmers from the markets (Van der Heijden, 2010).

The importance of trust in the relationship between sellers and buyers is confirmed by Anseeuw, Van Rooyen, and D'Haese (2002), who found one of the main problems faced by the flower sellers to be the quality and reputation of their flowers, and Randela *et al*. (2008) who found that trust influences the degree to which small-scale cotton farmers participate in the market.

- **Lack of market information**

Lack of access to market information is another cause of the higher levels of transaction cost faced by emerging farmers. Baloyi (2010) indicates that 76% of the farmers he interviewed in the Limpopo Province do not have access to market information, especially information on market prices and seasonal trends in the demand for agricultural products. Respondents also lack information regarding quality requirements for the products, the best times and places to sell their produce, and information on potential buyers for their produce (Baloyi, 2010). As a proxy for transaction cost, De Bruyn *et al*. (2001) found that access to market information has a significant impact on the level to which cattle farmers from Namibia sell meat through the formal market. The decision whether or not smallholder maize farmers sell their maize was found to be influenced by access to agricultural information (Masuku *et al*., 2001). Similarly, Randela *et al*. (2008) found that access to market information has a statistically significant influence on the degree of market participation by small-scale cotton producers.

- **Distance to the market**

Distant input and product markets are also considered to be major barriers to market access (Van der Heijden, 2010). The distance of the farms from the input and product markets also

contributes to the high levels of transaction cost faced by emerging farmers (Baloyi, 2010). Especially perishable products such as fresh produce are negatively affected by a large distance from the market, given that smallholder farmers typically do not have access to refrigerated transport facilities to keep the produce in a good quality while being transported to a distant market (Baloyi, 2010). It is, however, not only the producers of perishable products that are influenced by the distance to the market. When investigating the influence of transaction cost on the marketing behaviour of Namibian cattle farmers, De Bruyn *et al*. (2001) found that the greater the distance of the farm from the auction point, the smaller the proportion of cattle sold through the formal market. Masuku *et al*. (2001) found that the transport cost influences the decision of which marketing channel to use by smallholder maize farmers. Since the transport cost depends on the distance to the market, Masuku *et al*. (2001) too, provide evidence that the distance to the market has a major influence on smallholder farmers' use of formal marketing channels.

- **Lack of support**

Given the stringent requirements with regard to the consistent supply of a sufficient volume of good quality produce, it is understandable that there is a major need for support services to assist small-scale farmers to meet the requirements. Ortmann and King (2010) cite Anseeuw *et al*. (2000) who found that informal street-sellers of cut flowers in Pretoria indicated that the weak support infrastructure is a major problem that they face. Van der Heijden (2010) mentions that case studies show that rural households who have access to markets and the necessary support services have succeeded in producing for the market. The important role played by support structures to assist emerging farmers to meet the stringent requirements is also evident from the body of literature reporting on success stories where emerging farmers are successfully participating in commercial agri-food chains (Weatherspoon and Reardon, 2003; Bates and Sokhela, 2009; Louw, Vermeulen and Madevu, 2006; Denison *et al*., 2009). Extension as a support service is an important means for linking farmers to the new technology (Baloyi, 2010) that may contribute to them producing higher volumes of good quality produce in order to meet market requirements.

2.3.2.2.2 Success stories where emerging farmers in South Africa are successfully participating in commercial agri-food chains

Some of the success stories that have been documented include the studies by Hendriks and Lyne (2009), Louw *et al.* (2008), Louw, Vermeulen and Madevu (2006), Bediako and Debrah (2007), Ewert, Eva and Hamman (2006), and Sartorius and Kirsten (2002).

Hendriks and Lyne (2009) edited a report on a case study that aims to investigate whether or not food security will improve when smallholder access a niche market. The study was

conducted with members of the Ezemvelo Farmers' Organisation (EFO) in the Embo community in the KwaZulu-Natal Province of South Africa. They found that fully certified organic farmers earn farm incomes that are more than 175% higher than the income earned by non-organic certified producers in their study area. Ferrer *et al*. (2009) found that certified growers were less risk averse than those farmers who are not certified to produce organic crops. Such a finding suggests that the personal characteristics of the farmer, such as the entrepreneurial skills (that relate very much to the risk attitude of the farmer), may have an important role to play in whether or not he will participate in a high-value market. Importantly, the study did identify some shortcomings that still need to be improved. Chitja *et al*. (2009) found that the smallholders were not well informed with regard to the different types of crops that could be grown organically in that region, the required rate for applying organic fertiliser to maintain soil fertility, composting techniques or natural pest controls. Respondents were also found to be in need of more information about the institutional, governance and contractual arrangements that were adopted by EFO, and means to improve such arrangements to allow EFO to better serve its members (Stefano *et al*., 2009). Katundu, Hendriks and Gadzikwa (2009) found that farmers were not informed about the benefits of sequential harvesting of potatoes, although they were well trained in organic production methods. Hendriks and Lyne (2009) conclude that the studies by Chitja *et al*. (2009), Stefano *et al*. (2009) and Katundu *et al*. (2009) all agree that there is a definite need for better teamwork between the farmers, external agents, researchers, and extension staff. Hendriks and Lyne (2009) conclude that there is some evidence that food security has improved by linking the farmers to the high-value market, but they question the sustainability of the project due to institutional, contractual, and organisational flaws. They recommend that EFO should be organised in the form of an investor-owned firm. They also argue for higher level institutional change in order to ensure property rights that may promote an efficient land rental market to allow farmers to increase their land size.

As part of the Regoverning Markets programme, Louw *et al*. (2008) discuss three diverse case studies where small-scale farmers are successfully linked to mainstream agri-food systems in South Africa. The first case study is concerned with tomato processing. Two of the largest tomato processing companies (Giant Foods and Tiger Brands) in the major tomato production region in South Africa (Limpopo and Mpumalanga provinces) procure their tomatoes from local farmers. Giant Foods procures about 60% of its tomatoes from emerging farmers, with the remaining 40% being supplied by two or three large commercial farmers. Giant Foods typically do not have contracts with the emerging farmers and the price depends on the price of tomatoes from China. Tiger Brands works with ECI-Africa to manage the PAL (Promoting Agribusiness Linkages) project funded by USAID. Tiger Food manages the tomato cultivars that are planted by the farmers to secure the flow of tomatoes to the factory. The second case study is concerned with an initiative of the Spar supermarkets in Thohoyandou and Giyani in the Limpopo Province of South Africa (Bienabe and Vermeulen, 2007). The target market of

the supermarkets, both in Thohoyandou and Giyani, is low income rural communities. Both stores procure directly from local farmers due to the remoteness of their locations from distribution centres and fresh produce markets. By procuring from the local small-scale farmers, the stores adhere to the corporate strategy of the Spar group. The Giyani Spar provides its suppliers with personalised technical assistance and a flexible interest-free production loan system for technological investment and the purchase of inputs. The case of the Thohoyandou Spar is discussed in more detail below in the case study by Louw *et al*. (2006). The last case study referred to by Louw *et al*. (2008) is that of Thandi Fruit and Wine, which was conducted by Ewert *et al.* (2006). Thandi Fruit and Wine is a partnership between workers, growers, wine and fruit export businesses and the state. According to Louw *et al*. (2008), the Thandi project has "sustained itself for more than ten years in a domestic and international environment with a skewed trade regime and unforgiving competition." Workers who are involved with the Thandi project, and their families, have acquired shares in a fruit and wine business which can be considered to be successful by normal business standards. Louw *et al*. (2008) argue that the case of the Thandi project shows that ordinary farm workers can become co-owners of a successful commercial agribusiness. It is, however, a complicated and time consuming process that requires "political will, partnerships, capital, know-how, and patience". From the three case studies, Louw *et al*. (2008) conclude that a multi-actor approach is required for the successful integration of emerging farmers into commercial agri-food systems. Louw *et al*. (2008) argue for strengthening of collective activities to reduce transaction cost and increase negotiating power, and sustained capacity building for farmers to enhance their competitiveness.

Research by Louw, Vermeulen, and Madevu (2006) illustrates the potential for successful, mutually beneficial engagement between the commercial sector and small-scale farmers. Their case study is also about the Spar supermarket in Thohoyandou in Venda, which provides a market for the vegetables of small-scale farmers. In addition, it also provides a number of support services to the farmers. The Thohoyandou Spar has a policy that involves the procurement of fresh produce from the surrounding area as far as possible. They also commit themselves to pay a fair, market-related price and they try to build long-term trust relationships with fresh produce suppliers (Louw *et al*., 2006). The services to emerging farmers include the provision of interest-free production loans of R2 500 to farmers supplying vegetables, upon presentation and approval of a business plan; frequent farm visits by Spar personnel; a requirement of progress reports from the farmers to enable Spar personnel to provide management support; providing technical training and assistance regarding product quality standards; and providing a virtually unlimited and stable market for the farmers' fresh produce based on a verbal contract and involving a very strong trust component. A follow-up interview found that the same model has been replicated at five new Spar outlets. Louw *et al*. (2006) conclude, however, that it is not enough to merely transfer or duplicate the model as a whole. One needs to acknowledge the dynamics of the community and region and then adapt the

model accordingly. Thus, the most important finding of their study is that private entities could serve as important facilitators of market entry for the emerging agricultural sector in South Africa.

Bediako and Debrah (2007) report on a sustainable linkage that was developed between emerging farmers from Zanyokwe in the Eastern Cape and one of the major retail stores in South Africa, Pick ‘n Pay. The project identified and facilitated the creation of sustainable linkages between farmers and the private sector by using information on the products of small-scale producers, and information regarding the needs of business. By doing that, Bediako and Debrah (2007) argue that they were able to bridge the gap from both ends of the production chain. The necessary information was obtained from a number of workshops that were organised. In the workshops, Pick ‘n Pay outlined the purchase requirements and product standards, and procedures to be followed when contracting the farmers. Farm visits and farmer tours were also organised to expose farmers to commercial vegetable production and selling centres, to learn about production techniques, quality, grades, standards and packaging. The fact that all role-players participated in identifying and facilitating the linkage between the farmers and Pick ‘n Pay may be a major contributor to the success story documented by Bediako and Debrah (2007).

Sartorius and Kirsten (2002) report on a case study of small-scale timber farmers in KwaZulu-Natal who are in a contract farming relationship with Sappi-Saiccor. A tree-farming scheme (Project Grow) was launched in 1983 by Sappi Forests which aims to convert rural subsistence farmers into emerging commercial operations. The management of the project, however, has been contracted out to a rural development non-governmental organisation since 1989. According to Sartorius and Kirsten (2002), the Project Grow arrangement provides small-scale farmers with financial assistance, seedlings, technical advice and a guaranteed market for the timber at harvest. Technical advice is provided upon request to the contracted small-scale farmers by Sappi Forest Division. All farmers (both commercial and small-scale) who want to supply timber are obliged to enter into a timber purchasing agreement with Sappi Forests (Pty) Limited. Agreements can be modified to separately specify the conditions related to the financing arrangements. All contracts that are used to govern the relationship between the small-scale farmers and Sappi-Saiccor accommodate communal land tenure and tribal authority requirements (Sartorius and Kirsten, 2002). Sartorius and Kirsten (2002) found that the participants of Project Grow are competitive with other growers of timber. They warn, however, that the fact that small-scale farmers receive free loans and high levels of company inputs make it unlikely that the relationship between the small-scale farmers and Sappi Forest will contribute to developing the emerging farmers into commercial farmers.

The volume of literature on the topic of linking emerging farmers to markets suggests that there are huge expectations with regard to the concept of the role to be played by a value

chain in contributing to rural development. A relatively new application of the concept is to assess water use along the value chain as the product moves from the input suppliers to the end consumer. A review of some of the research that applies the concept of a value chain to considering water use along the chain is presented next.

2.3.3 ASSESSING WATER USE ALONG THE VALUE CHAIN

From a review of the literature, four research fields could be identified that are concerned with water use along value chains: life cycle assessment (LCA); virtual water; water footprint; and quantifying the value of water used in a value chain. Each research field has its own reason for considering water use along the value chain. The different applications are discussed briefly next.

2.3.3.1 Life cycle assessment (LCA)

Life cycle assessment is a "widely accepted and applied environmental management tool to measure the various environmental interventions caused by products from cradle to grave" (Berger and Finkbeiner, 2010). More specifically, LCA is concerned with the environmental impact of a product (Desmyter *et al*., 2006) by considering the impact at each stage within the life cycle of the product (SAIC, 2006). A LCA thus considers the environmental impact of all activities at the respective stages from the point where raw materials are gathered from the earth to create a product, to the point where all materials again are returned back to the earth (SAIC, 2006) after the product has been used or consumed.

Traditionally, the use of freshwater received very little attention in LCA. The focus of LCA was mainly on the energy consumed, and/or the emission of greenhouse gases and other toxic substances along a product's life cycle. The main reasons for neglecting freshwater use include that LCA was mainly used to assess industrial products that require low amounts of water in their production, and that the method of LCA was developed in industrialised countries that do not suffer from water scarcity (Berger and Finbeiner, 2010). In South Africa a number of LCA-studies have been conducted in the water sector since 1999 (Buckley, Friederich, and Von Blottnitz, 2011). Following the very nature of LCA the focus of attention of the studies is mainly on the environmental impact associated with producing and distributing potable water, and using water in industrial processes, rather than on the actual volumes of water that was used and/or consumed.

Compared to industrial products, agricultural products typically require large volumes of water for production. Water pollution moreover "is exacerbated by agricultural drainage containing fertiliser, pesticides, and sediment" (Dominguez-Fays *et al.*, 2009). Freshwater use may be a considerable contributor to the aggregated environmental impact of an agricultural product. It

is thus crucial to consider the consumption of freshwater in LCA studies of agricultural goods (Pfister, Koehler and Hellweg, 2008).

Besides the importance of considering freshwater use for agricultural products, the overall importance of considering freshwater use in LCA is recognised of late, as is evident from the editorial by Koehler (2008) in the *International Journal of Life Cycle Assessment*. Koehler (2008) refers to the timeliness of adding a section on 'Water Use in LCA to the International Journal of Life Cycle Assessment. A formal call is made for papers "to stimulate publications and methodological advancements contributing to an improved inventory analysis and impact assessment of freshwater resources" (Koehler, 2008).

Berger and Finkbeiner (2010) argue that considerable progress is already being made of late in developing a method to account for water use in LCA. However, a major shortcoming that still remains in the newly developed methodologies is that most of them still do not consider the consumption of green water (Berger and Finkbeiner, 2010). Green water refers to rainwater that is stored in the soil as soil moisture (Hoekstra *et al.*, 2009) and is especially relevant in crop production (Berger and Finkbeiner, 2010). Especially in the case of an LCA for an agricultural product, it is crucial to also consider the consumption of green water. Methods that do consider the consumption of green water include virtual water and water footprint (Berger and Finkbeiner, 2010).

2.3.3.2 Virtual water

Virtual water in an agricultural or industrial product refers to all the water that was used to produce the product (Hoekstra, 2002). Virtual water comprises all the water that has been used in the actual manufacturing processes, as well as the water used in background processes such as material or energy production (Berger and Finbeiner, 2010).

The idea behind the development of the concept of virtual water is that the trade in virtual water may be an instrument to achieve water security (Hoekstra, 2002) in water-scarce countries. Fishelon (1992) mentions that Israeli economists in the 1980s realised that exporting water intensive oranges and avocados from the semi-arid Israel also implied the export of the water (Allan, 2003) that was used to produce the product (virtual water). The economists argued that it does not make economic sense to export scarce Israeli water. Given that water should be considered an economic good (Hoekstra and Hung, 2003) the theory of comparative advantage suggests that the international trade of an agricultural product "moves the 'virtual water' from comparatively advantaged regions, where there is a surplus of soil water in soil profiles, to comparatively disadvantaged regions… where water is scarce." (Allan, 1998). Rather than a water-scarce country using its own scarce water resources to produce a water intensive product itself, it should import the product from a water-rich country. The net

import of virtual water may consequently relieve some of the pressure on a nation's own water resources (Hoekstra, 2002).

Virtual water is divided into green water, blue water and grey water (Berger and Finbeiner, 2010). Green water includes the "precipitation on land that does not run off or recharge the groundwater but is stored in the soil or temporarily stays on top of the soil or vegetation" (Hoekstra *et al.*, 2009). The consumption of green water refers to evapotranspiration of rainwater during plant growth (Berger and Finbeiner, 2010). The consideration of green water is a major contribution of the concept of virtual water, especially when quantifying the volume of water used for the production of agricultural products. Blue water, on the other hand, includes all the fresh surface and ground water, such as the water in freshwater lakes, rivers and aquifers (Hoekstra *et al.*, 2009). Blue water consumption thus refers to the volume of ground and surface water that evaporates during production (Berger and Finbeiner, 2010). Lastly, grey water refers to the volume of water that is required to dilute polluted water to acceptable levels (Berger and Finbeiner, 2010).

2.3.3.3 Water footprint

The concept of a water footprint is relatively new, having been introduced only in 2002 by Hoekstra (Hoekstra, 2003). The water footprint refers to the total volume of freshwater that is used to produce a product, measured along the full supply chain. It thus includes both direct and indirect water use (Hoekstra *et al.*, 2011). Thus, while LCA focuses on water-polluting substances and their affects, the concept of water footprints is more concerned with water usage (Buckley *et al*., 2011).

Similar to the concept of virtual water, the water footprint consists of a green water footprint, a blue water footprint, and a grey water footprint. The green water footprint includes the volume of rainwater that is consumed in the production process. It refers to the total rainwater evapotranspiration plus the rainwater that is incorporated into the product. The blue water footprint refers to the total volume of surface and ground water that is consumed to produce the product. The consumed water includes the water that was used and then evaporated or is incorporated into a product, and the water that was abstracted from surface of groundwater in a catchment and returned to another catchment or the sea. Lastly, the grey water footprint is an indication of the level of pollution of the freshwater associated with the production of the product along the supply chain. The grey water footprint specifically refers to the volume of freshwater that is needed to dilute the polluted freshwater to again meet the specified quality standards (Hoekstra *et al.*, 2011).

While there is strong similarity between the concepts of virtual water and water footprint, the major difference relates to the scope of application by the water footprint. The water footprint

of the product is the same as the virtual water content of the product when referring to the water footprint as being the volume of water used to produce a product. The water footprint, however, has much wider application than the above example. The water footprint is a multi-dimensional concept that considers the volume of water used (similar to virtual water), but also indicating where the water footprint is located, the source of water used (i.e. green, blue or grey water), and when the water is used (Hoekstra *et al.*, 2011).

Water footprints can be calculated for a specific product, for a consumer or a group of consumers, for a geographically delineated area (i.e. river basin, province, or nation), and also within a nation or for national consumption (Hoekstra *et al.*, 2011). Hoekstra *et al.*, (2009) define the water footprint of a product as the freshwater that is used to produce a product by considering all the water use at the different stages along the production chain. It considers the green and blue water that has been consumed, as well as the volume of freshwater that is required to dilute pollutants to ensure that the water meets quality standards (grey water). The product water footprint is calculated by adding the water footprint of all the processes along the chain. The water footprint of a consumer refers to the total volume of freshwater that is consumed and polluted for the production of goods and services consumed by a consumer. The water footprint of a group of consumers simply is the sum of the water footprints of all the individual consumers. Again, the water footprint of consumers considers both direct and indirect water use.

The water footprint within an area is the total volume of freshwater that is consumed and polluted within the boundaries of the area (Hoekstra *et al.*, 2009). In such an application of the water footprint concept, it is very important to clearly define the boundaries of the area that is considered. When calculating the water footprint within a geographically delineated area, it is also worth to note the virtual water balance of the area under consideration. The virtual water balance is the net import of virtual water over the period, which is calculated by subtracting the virtual water export from the virtual water import from the region.

The water footprint of the consumers in a nation includes both the internal and the external water footprint of the nation. The internal water footprint refers to the domestic water resources that have been used to produce goods and services that are consumed by the consumers of the nation under consideration. The external water footprint includes all the water resources that have been used in other nations to produce the goods and services that are consumed in the nation under consideration (Hoekstra *et al.*, 2011).

Only two studies have yet been undertaken in South Africa to calculate water footprints. As members of the Water Footprint Network, SABMiller and the World Wildlife Fund (WWF) worked together and contracted a consultant in 2009 to quantify the water footprints of the beer value chains in South Africa and the Czech Republic in order to understand the

ecological and business risks they face. They used the water footprints (green, blue and grey water footprints) to develop a matrix of water risks for each business. By determining the water footprints, SABMiller was able to develop action plans to mitigate the identified risks. Within the South African water footprint they found that agricultural water use is the biggest risk area. SAB Ltd is currently considering whether or not an existing toolkit of WWF South Africa for sustainable agricultural practices for sugar cane growth can be adjusted for barley production in order to mitigate the risk. Within the second study, the water footprint for the Breede River catchment was calculated by Pegasys Consultants (2010). By linking economics to the water footprint, Pegasys Consultants (2010) found that different water uses in the area generate different returns in value and employment, and concluded that there are efficient and inefficient uses of water in the catchment. The two applications of water footprinting in South Africa show that the concept is useful to identify potential risks in terms of the availability of water to perform essential activities to produce a product, and to investigate the degree of efficiency of different water allocations.

2.3.3.4 Quantifying the economic impact of water allocated to agriculture

Another innovative application of value chain analysis is done by Crafford *et al*. (2004). Similar to all other value chain analysis studies, they use value chain analysis first to map and quantify the value chains of three different land use types, forestry, irrigated sugarcane and irrigated sub-tropical fruits. As a second step in their study they conduct economic, social and environmental impact analyses on each of the chains in order to determine the effect of using water for the different crops. More specifically the economic impact assessment aims to measure and compare the total economic benefits from water use by each of the respective applications. They include both the direct and indirect economic benefits that are realised both in backward and forward linked sectors. The environmental impact assessment aims to determine the impact of each of the crops on the environment, while the social impact analysis again sets out to measure the social impact that respective chains have on households and individuals. Again they examine both the direct and indirect employment and enterprise linkages, and also the external social benefits and costs on households that result from these three land uses. Crafford *et al*. (2004) argue that their study reveals the importance of considering the indirect economic benefits in comparing social worthiness of alternative productive uses of water and other economic resources. Interestingly too, they find that land uses that perform best in terms of economic value added to water use are not necessarily the most efficient water use once its forward and backward linkages are assessed. Also value chains that perform best in terms of economic and employment benefits per amount of water used are not necessarily the most efficient once their environmental and social externalities are considered.

2.3.4 *CONCLUSIONS DRAWN FROM LITERATURE ON APPLICATIONS OF VALUE CHAIN ANALYSIS IN AGRICULTURE*

From the literature it is evident that chain analysis has a variety of different applications. Applications that are relevant for the purpose of this study include, amongst others, the use of chain analysis to assess the level of competitiveness of different sub-sectors; finding ways to link small-scale farmers to commercial agri-food chains; and assessing the impact of water use on alternative land uses.

Porter's Diamond has been successfully applied by a number of researchers in South Africa to investigate potential success factors that may contribute to enhance the levels of competitiveness of a variety of different sub-sectors. Although it is recognised to be an important application of chain analysis, an industry analysis will not be performed to investigate the levels of competitiveness of the sub-sectors within which the farmers from the respective case studies are to be integrated. The study is based on the assumption that those sub-sectors are already competitive with good potential for growth. Projections by Bureau for Agricultural Policy (BFAP) (2011) for the NDP (2011) group the crops grown by the farmers in the case studies (raisins and vegetables) among the sub-sectors that exhibit good potential for growth. NDP (2011) consequently listed both sub-sectors among those with great potential to contribute to meeting the vision for 2030. Moreover, the focus of attention of this study will not be on a whole sub-sector, but rather on the functioning of a specific part of the chain within the sub-sector where the farmers are to be integrated. The idea is to identify potential solutions (key success factors) that may contribute to the successful linking of the farmers to chains within the sub-sectors that show such good potential for growth.

From the literature on the application of chain analysis to investigate ways to link emerging farmers to the mainstream economy it is evident that much of the attention is upon identifying the constraints that exclude the farmers from participating in commercial agri-food chains. The stringent quality requirements that resulted from globalisation and liberalisation are listed as a major barrier to entry. Other stumbling blocks can roughly be grouped under institutional failures (i.e. small scale of operations, insecure property rights and the lack of access to credit), high transaction costs (i.e. poor conditions of physical infrastructure, lack of trust among the participant, lack of market information, and the distance from the farms to the market), and the lack of support faced by emerging farmers. Most, if not all, of the documented constraints are expected to also feature in the case studies within this study. A comprehensive analysis of the institutional environment within which the farmers operate, and of the specific transactions within which the farmers are to participate, thus are crucial to find potential solutions to overcome such constraints.

The review of success stories from South Africa where emerging farmers are linked to commercial agri-food chains also highlights some interesting findings. There are cases where emerging farmers are participating in contractual relationships with large processing companies. Those farmers thus are in vertically coordinated relationships with their buyers. Transaction Cost Economics (TCE) theory suggests that vertical coordination may contribute to reducing transaction costs (Williamson, 1998). The contractual relationships thus may have assisted the farmers to overcome some of the transaction costs that typically exclude emerging farmers from participating in commercial agri-food chains. In some of the other success stories the emerging farmers supply their produce directly to retail stores, albeit not under contract. It is important to note that in all of the cases the initiative came from the retail stores. Although the corporate strategy of the group to which two of the retail stores belong includes the procurement of produce from local small-scale farmers, the authors also indicate that the distribution centres and fresh produce markets are far from those particular stores. The stores thus do also have a financial incentive to procure from the local small-scale farmers. The success stories thus provide evidence that retail stores may be willing to procure from emerging farmers if the incentives are strong enough. In both groups of success stories it is also evident that the (private sector) buyers provide substantial levels of support to the farmers. Ultimately, the produce still needs to meet the stringent quality requirements of the consumers. The success stories thus show that, if incentives are correctly aligned, private sector firms are willing to procure from emerging farmers, and also to provide them with the necessary support. Once the buyers commit to procure from the emerging farmers, they have a vested interest in the quality of the produce since poor quality produce may ultimately damage their brands. Thus, it is important to assess the potential relationships between the farmers and major buyers in the chains to identify incentives that may convince the buyers to procure from the farmers.

From the review of literature that considers water use along value chains, no studies were found that economically optimise the water that was used along the whole value chain through which the product was moved to the end consumer. The objective of this study to optimise water use along the whole value chain thus is very much a novel approach to optimise water use. Applications that were found in the literature that provide useful insight and may contribute to meeting this objective, include life cycle assessments (LCA), calculations of virtual water and water footprints, and quantifying the economic impact of water that was allocated to agriculture. While the focus of attention of LCA is more on the environmental impact of water use, the concept of life-cycle thinking provides insight to distinguish between the respective stages in the life cycle of the product where water is used. The concepts of virtual water and water footprints provide methodological approaches for determining the amount of water that was used to produce the product. Since a distinction is made between green, blue and grey water, the concepts of virtual water and water footprints allow for calculating the volumes of the respective types of water that was used to produce the product. Ultimately it will allow for the economic optimisation of a specific type of water (blue water in this case) that was used according to the

scope of the study. Lastly, the study that investigated the economic impact of water that was allocated to agriculture provides information on different approaches that can be used to put a value on the water that was used in the value chain. Thus, although none of the applications by itself is completely suitable to meet the objective, each application has a contribution to make to the successful completion of the objective to optimise the water that was used along the whole value chain.

The discussion of the conclusions that can be drawn from the literature review concludes Chapter 2. Within Chapter 3, the focus of attention shifts to the development of the conceptual framework and a discussion of the methods that will be used to meet the objectives of this study.

CHAPTER 3

CONCEPTUAL FRAMEWORK AND METHODS OF ANALYSIS

3.1 INTRODUCTION

In essence, Chapter 3 covers the theoretical framework that is followed in this study, as well as the procedures that are used to answer the specific research questions. Chapter 3 starts with a discussion of the concept of a value chain to demarcate the scope of analysis, followed by a discussion of the integrated structure-conduct-performance (SCP) and the New Institutional Economics (NIE) framework of Williamson (2000). The combined approach allows for more breadth when analysing the complex system where role-players at two distinct levels of development have to be integrated into one system in order to contribute to food security through the alleviation of rural poverty in South Africa. Each of the levels is discussed individually, with special emphasis being placed upon the similarities and differences between the components to emphasise the contribution of the theoretical framework towards an in-depth analysis of the agri-food system under consideration. After the discussion of the theoretical framework, the procedures that are to be followed in order to answer the specific research questions are discussed.

3.2 VALUE CHAIN ANALYSIS

When performing value chain analysis it is critical to comprehend the scope of the analysis. One has to identify all of the actors who are operating within the value chain to ensure a comprehensive understanding of all the factors that influence the way participants in the value chain operate. The next section focuses on the different actors that are to be considered when performing a value chain analysis.

Much of the research on value chain analysis considers only those agents who are directly involved with the primary product. Roduner (2007) argues for a systemic view of value chains that integrates three important levels within a value chain network, namely, value chain players, influencers and supporters. A systemic view of the value chain allows for the discovery of opportunities and bottlenecks within these levels, as well as in the dynamic interactions between the levels. A schematic representation of the three levels of the value chain is shown in Figure 3.1 (Roduner, 2005).

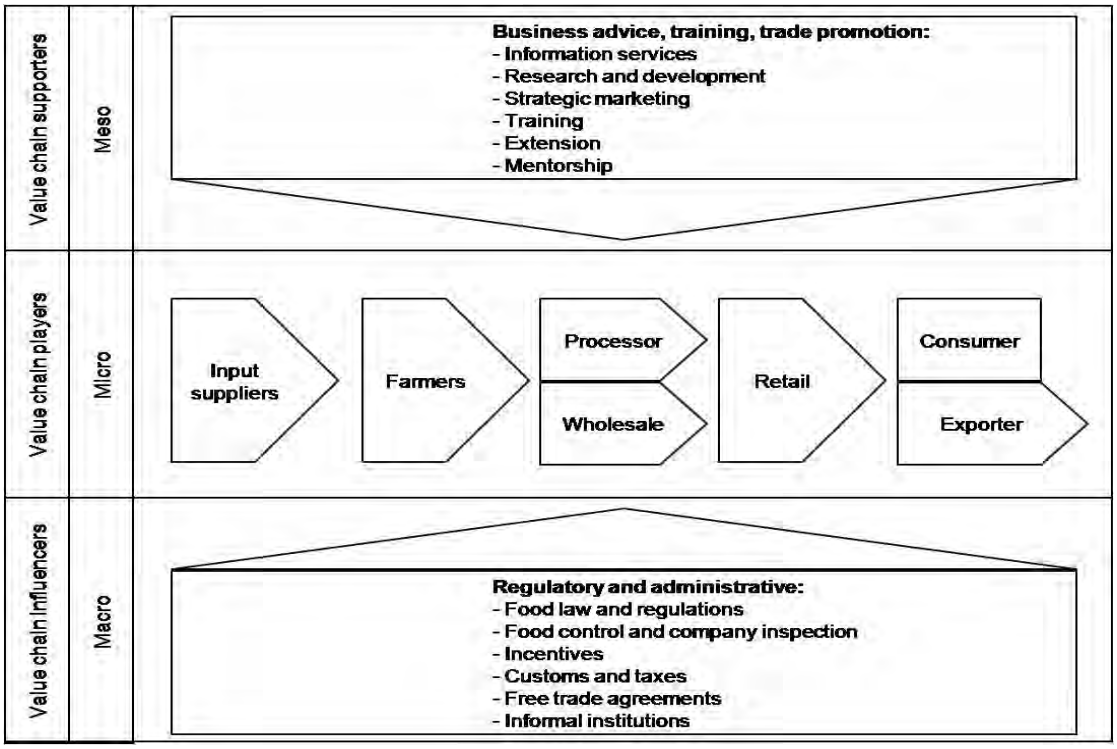

Figure 3. 1: Value chain players, influencers and supporters

Source: Adapted from Roduner (2005)

Figure 3.1 shows that **value chain players** are directly involved with transforming the physical product into the final product. These value chain players do not operate in isolation, however. There are a number of rules and regulations that have to be complied with when operating within a value chain. Roduner (2005) calls those rules and regulations **value chain influencers**. Value chain influencers influence the operations within the chain by providing the regulatory and administrative conditions that have to be met by all players within the value chain. The last level is called the **value chain supporters**. These include all actors responsible for providing information, training and promotions. It is their duty to support the value chain players to operate in such a manner that they meet all the rules and regulations specified by the influencers. The approach followed by Roduner (2005) thus provides a holistic view of the value chain under consideration. Rather than focusing only on the processes by which inputs are transformed into the final product, it considers all factors that influence the way the value chain players operate within the chain, and also all the support services that are available to allow value chain players to operate in such a way as to keep the value chain competitive.

Keep in mind that the stringent quality requirements and the lack of support were identified in the literature to be major barriers to entry that exclude emerging farmers from participating in commercial agri-food chains. By paying special attention to the rules and regulations (including the quality standards) that have to be met, the farmers will have a clear understanding of the requirements if they want to participate in the specific value chain. By understanding the

requirements beforehand, a strategy can be formulated that will help the farmers to comply with all of the regulations. Linking to the benefits associated with timely attention being paid to the stringent requirements, the conscious focus on available support services may also be fruitful to the farmers. A potential support team may be identified that can help the farmers to comply with all of the stringent requirements. The timely identification of such a support team will allow for exploring potential incentives that may convince such individuals/organisations to actively support the farmers. Thus, a major barrier to entry that exclude emerging farmers from commercial agri-food chains can be overcome by considering all three levels in the value chain when aiming to link emerging farmers to the chain.

The next section provides a discussion of the integrated New Institutional Economics and Structure-Conduct-Performance framework as a theoretical framework that can be used to investigate a value chain in terms of all three levels as recommended by Roduner (2007).

3.3 INTEGRATED NEW INSTITUTIONAL ECONOMICS AND STRUCTURE-CONDUCT-PERFORMANCE FRAMEWORK

Kherallah and Kirsten (2002) argue that the changes in the food and agricultural sector in developing countries in the aftermath of market liberalisation and government withdrawal provide a fertile ground for the application of the New Institutional Economics (NIE) framework. NIE is fundamentally concerned with problems of market coordination and the incentives for economic agents to devise institutional responses to the problems of market imperfections (Dorward, Kydd, and Poulton, 1998). NIE offers several related perspectives and operates both at a macro and at a micro level (Williamson, 1996). From the macro perspective, it is concerned with the institutional environment consisting of the political and legal rules of the game. From the micro perspective, again, it is concerned with the institutions of governance that deal with modes of organisation and contract within firms and markets.

Recognising the need to analyse production and marketing within an institutional economics framework, Milagrosa (2007) went further by combining two analytical approaches into a single structure by positioning the Structure-Conduct-Performance (SCP) approach to operate within the Economics of Institutions framework of Williamson (Figure 3.2). A similar combined approach was also used by Hai (2003), who investigated the organisation of the liberalised rice market in Vietnam. The benefit of using such a combined approach lies therein that it allows the theoretical examination of society on four interrelated levels (the social embeddedness level, institutional environment, governance structures and resource allocation) and then also the appropriate evaluation at the lower three levels using the structure-conduct-performance analysis framework, which is more of an applied approach. Milagrosa (2007) argues that there are strong similarities between the two frameworks, but that the differences allow for the two approaches to supplement each other at points where the other method is deficient. The high

degree of similarity and complementarity between the two frameworks contributes to the combined approach giving much more depth when assessing behaviour within the value chain.

Figure 3.2 shows that the four levels of the NIE framework are connected. The downward arrows indicate that the higher social level imposes constraints on the lower levels, while the upward arrows again indicate feedback from the lower level to the upper level (Milagrosa, 2007). The downward arrow between the second and third levels, for example, implies that the institutional environment (Level 2) influences the governance structures (Level 3) by providing the rules and regulations within which the governance structures have to operate. In the longer run, the governance structures will have an influence on the institutional environment by providing feedback. Similarly, the higher levels in the SCP framework also influence the lower levels, with feedback from the lower levels influencing the upper levels in the longer run. The respective levels of the integrated framework are discussed in more detail below.

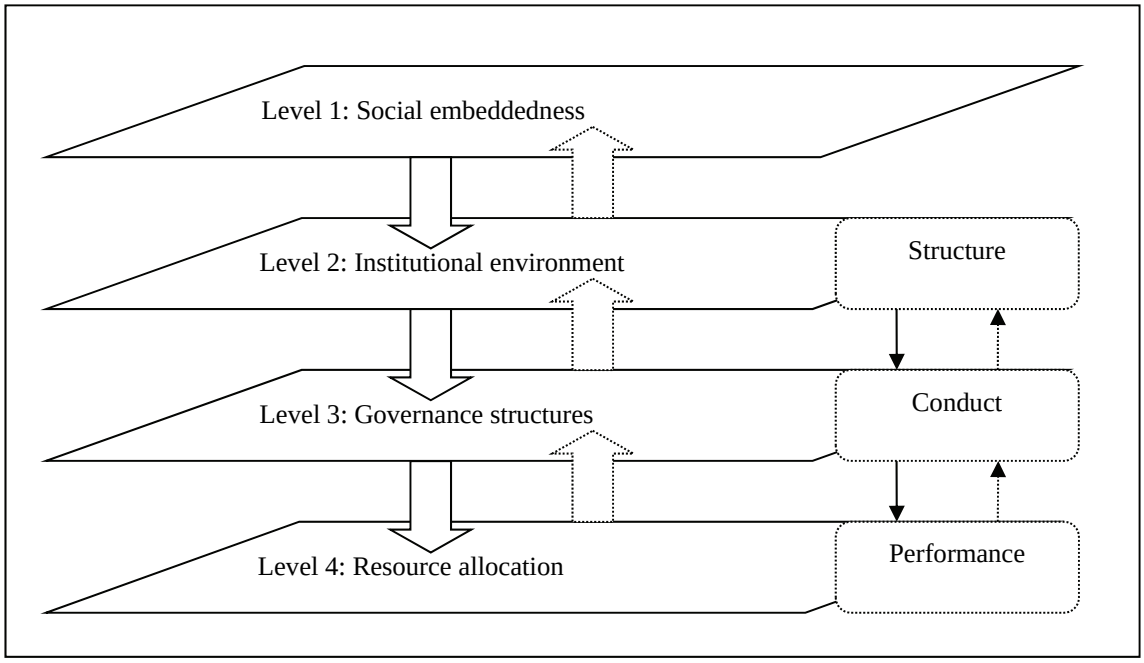

Figure 3. 2: Integrated Economics of Institutions and Structure-Conduct-Performance (SCP) framework..

Source: Milagrosa (2007).

3.3.1 STRUCTURE-CONDUCT-PERFORMANCE (SCP)

Structure-Conduct-Performance is one of the important methods of analysis in industrial organisation theory (College of Agricultural Economics and Trade (CAET), 2001). It provides a straightforward measure of market efficiency (Milagrosa, 2007). According to the theory of SCP, the structure of the market determines the way in which the actors within the market make decisions (conduct), and conduct of those actors in turn determines the performance of the

market (CAET, 2001; Hai, 2006; Milagrosa, 2007). The dynamic SCP model acknowledges, however, that the performance in turn will also influence the conduct and the structure in the longer run (Hai, 2006). For the purpose of this study it is important to note that the SCP-analysis is not performed to analyse the whole industry, but rather to gain insight into the level to which the farmers perform given the way they and other role-players behave within their physical environment. The focus of attention thus is on that part of the value chain in close vicinity of the location where the specific groups of emerging farmers are operating.

3.3.1.1 Structure

Structure refers to the characteristics of the market or industry that have a strategic influence on the nature of competition and pricing within the market (Allen, Reeves and Mumma, 1999). The structure component of the SCP can be separated into farm-structure and market structure.

Farm structure refers to the physical characteristics of the region, the distribution of land within the region, and also land ownership and tenure (Milagrosa, 2007). The characteristics of the region that are of importance include the specific location, its topography, the size of the population in the region, the proportion of the population involved in agriculture, the main crops produced in the region, and the total land area in the region. Land distribution is concerned with the number of farmers in the region, the average size of farms and also the distribution of farm sizes. Finally, farm structure is concerned with the different systems of land ownership and tenure that exist in the region under consideration. The number of farms related to the respective tenure systems, as well as the distribution of land under the respective tenure systems, are of importance (Milagrosa, 2007).

Market structure is generally concerned with “the characteristics of the organisation of a market which seem to influence strategically the nature of the competition and pricing within the market” (Bain, 1959). Hai (2003) considers the degree of market concentration, the degree of product differentiation. The existence of entry and exit barriers, and the distribution of power when assessing market structure. When assessing market structure, CAET (2001) considers the different types of markets that are available, the different marketing channels, and all the actors who are involved in moving the physical product from the farm to the final consumer. Milagrosa (2007) also considers the location of the input and product markets, the market infrastructure, and the availability and condition of road networks to and from the farms.

3.3.1.2 Conduct

Conduct refers to the behaviour of the agents within the farm and market structure. Conduct, again, can be divided into production and marketing conduct (Milagrosa, 2007). Production conduct is concerned with the cropping practices of the producers under consideration, the

farming techniques used, and the sources and availability of credit to those producers (Milagrosa, 2007).

Market conduct, on the other hand, refers to "the set of competitive strategies that a trader or a group of traders use to run their businesses" (Hai, 2003). When assessing marketing conduct, the aspects to be considered include the sources and availability of market information, the method of price formation, investment in new technology, research and development of new products, investment in technical training and services, the level of competition in the market, the types of contracts that are employed, and the marketing strategies that are used (CAET, 2001; Milagrosa, 2007).

3.3.1.3 Performance

The study of performance deals with the state of reality that is achieved by an industry (CAET, 2001) and refers to economic results (Hai, 2003). The performance component of the SCP analysis is concerned with the actual volumes of the respective crops that were produced, the sales, costs and income earned by the respective agents along the value chain, and also an analysis of the marketing margins (CAET, 2001; Milagrosa, 2007). A marketing margin is the difference in the price paid for the product at different stages along the value chain (Tomek and Robinson, 1990). The marketing margin thus includes costs such as packaging, transport, and storage of the product under consideration.

3.3.2 NEW INSTITUTIONAL ECONOMICS (NIE)

The NIE framework consists of four levels, where the higher level influences the level directly below by imposing constraints on the lower level. In the longer run, the lower levels influence the higher levels by providing feedback (Williamson, 1998). The first level represents social embeddedness, followed by the institutional environment at Level 2, governance structures at Level 3, while the fourth level is concerned with the allocation of resources and employment (Williamson, 2000; Milagrosa, 2007). The respective levels are discussed in more detail below.

3.3.2.1 Social embeddedness (Level 1)

Social embeddedness is located at the highest level and refers to customs, traditions, and societal norms (Williamson, 2000). Changes in social embeddedness occur at rates of centuries to millennia, and consequently the level of social embeddedness often is taken as a given by economists (Williamson, 1998). The concept of social embeddedness has been advanced, however, to explain why informal constraints have such a major influence upon the long term character of economies (Granovetter, 1985, as cited by Williamson, 2000). Putnam (1993) also

states that economists are increasingly interested in the role of culture as an explanation for why some countries or regions are rich and others remain poor.

The level of social embeddedness can be analysed using social capital theory (Williamson, 2000; Milagrosa and Slangen, 2005). Social capital consists of observable but non-contractual elements such as trust, shared norms and social networks (Slangen, 2005 as cited by Milagrosa, 2007). Putnam (1993) defines social capital as being "features of social organisation (for example trust, norms and networks) that can improve societal efficiency by facilitating coordinated action". Other elements also include volunteerism, reciprocity, associatedness, formal and informal organisation, traditions and beliefs. Of all of these elements of social capital, trust is argued to be the most important, since trust can make people go beyond the requirements of the contract, through early delivery, higher quality or some other means, to support their good intentions and sustain trust (Milagrosa and Slangen, 2005).

From the literature, there is ample evidence to prove the significance of social capital. It is acknowledged that social capital is an important factor behind economic development (Beugelsdijk and Schaik, 2001), since trust, norms and networks "[boost] economic and institutional machinery" (Putnam, 1993). It has also been argued that long-term economic development efforts hinge strongly on the levels of national, regional or local social capital (Ostrohm and Ahn, 2001, as cited by Milagrosa and Slangen, 2005). The acknowledgement of the importance of social capital is complemented by research that shows that social networks influence economic performance and general productivity. Putnam (1993) found that social capital has a major influence on horizontal networks, which in turn were found to play a major role in economic growth in Northern Italy. Chuzu (2005) cites Maluccio, Haddad and May (1999), who specify three mechanisms whereby household welfare might be affected by group activity. Firstly, group activity may reduce transaction costs by improving the flow of important information, such as new opportunities or threats, from one member to the next. Group activity may also promote consultative decision making and collective action. Lastly, group activity contributes to "the fostering of time-sensitive exchanges for mutual benefit by developing norms of civil behaviour, trust, and reputation dissemination." According to Murray (2005), there is also a reciprocal relationship between participation in group activities and trust. The more people participate in their communities, the more they learn to trust each other. Again, the more people trust each other, the more they are likely to participate in group activities. This reciprocal relationship shows the importance of using group activity continuously to increase social capital levels in order to benefit economic development.

3.3.2.2 Institutional environment (Level 2)

The second level of the NIE framework comprises the institutional environment and refers to all of the formal rules and informal constraints that regulate the way transactions are carried out

(Williamson, 2000). Changes within the institutional environment occur at the slow rate of 10 years to a century (Williamson, 1998).

Institutions are “humanly devised constraints that structure human interaction” (North, 1994). The importance of the institutional environment lies around the fact that “institutions form the incentive structure of a society, and the political and economic institutions, in consequence, are the underlying determinants of economic performance” (North, 1994). Institutions therefore play a significant role in shaping events at the downstream levels of governance and resource allocation.

Good institutions and good governance structures contain efficient information transfer mechanisms, which result in better informed decisions among parties involved. Good institutions thus create a more favourable environment, which supports economic growth. As argued by Milagrosa (2007) “Economic development and good institutions are mutually occurring reciprocal phenomena. On the one hand, economically developed areas demand for and contribute to good institutions. On the other hand, a good institution creates economic development.”

Formal rules and regulations

The institutional environment contains the formal rules and informal constraints that regulate the way transactions are conducted (Williamson, 2000). Actors involved in the production and marketing of agricultural products need protection against opportunistic behaviour. The types of protection mechanisms and the manner in which government arranges those mechanisms are translated into the formal rules of the institutional environment (Milagrosa, 2007). The formal rules include, amongst others, constitutions, laws, and other rules (North, 1994). The rules in the institutional environment aim to facilitate economic transactions and have to be respected by all actors in the market (Hai, 2003). The formal rules have the purpose to ensure that transactions are conducted in an efficient manner from society’s point of view. These formal rules and regulations are nowadays even more important than ever since more agricultural producers are linked to consumers and corporations of the rich nations. Those consumers not only demand choice, they also want quality, consistency and value (Kherallah and Kirsten, 2002). In order to supply agricultural produce to such buyers, producers have to meet the requirements specified in the formal rules and regulations at the institutional level.

As formal rules, property rights have a major influence on the way transactions are conducted. Slangen, Van Kooten and Suchánek (2004) argue that property rights over land and water are probably the most important formal rules in agriculture. The importance of property rights centres around the fact that externalities can be internalised if property rights are well-established (Coase, 1937). Property rights refer to formal and informal rules that determine

access to assets, both tangible (i.e. land, water, buildings, etc.) and intangible (i.e. contract rights, patents, etc.), and also the way those assets can be used (Herrera, 2005). The property rights give the holder of those rights the right to derive value from the asset by using it as he sees fit, to exclude others from using the asset, and to transfer the ownership of the asset to another party. Property rights thus give the holder of the rights an incentive to invest in the underlying asset.

The incentive embedded in property rights depends on the level of individualisation of ownership of the property right. The individualisation of ownership of the property rights can be expressed along a spectrum (Herrera, 2005). Open access refers to the absence of exclusive rights (anyone can use the resource as he likes) and lies at the one end of the spectrum. The other end of the spectrum is private property, which gives the holder exclusive decision-making power. Between private property and open access, there are also common property and state property. Common property refers to the situation where a collective entity (e.g. a co-operative group) owns the decision-making power, while state property refers to the situation where the government has the decision-making power (Herrera, 2005). Herrera (2005) argues that the lack of individual decision-making power serves as a disincentive for an individual to invest in the underlying asset. Within the South African context, the rules and regulations associated with the land tenure systems that apply at smallholder irrigation schemes are crucially important.

Formal rules and regulations associated with land tenure in South Africa

Most of the institutions that influence the behaviour of farmers in terms of land tenure relate to the land reform programme that was implemented by the first government of the new democratic South Africa in 1994. Land reform is a vital political issue in South Africa (CDE, 2005). In order to understand the institutions that relate to land tenure, one has to consider the historical context within which the institutions were established. The 19th century saw white colonial and settler governments depriving black (non-white) Africans of control of vast areas of land. During the first half of the 20th century the process of marginalisation continued with white governments aiming to destroy independent African farming communities in order to favour white commercial farmers. The 20th century also saw the apartheid regime forcing millions of Africans into overcrowded “homelands” (CDE, 2005). During the colonial and apartheid rule, land was regarded as an asset exclusively controlled by the white authorities (Rudman, 2009). The above was achieved through legislation such as the Natives Land Act of 1913, the 1936 Natives Trust and Land Act, and the Group Areas Act of 1950 (CDE, 2005).

The Natives Trust and Land Act of 1936 legislated that the land be held in “trust” for Africans by the South African Bantu Trust (later the South African Development Trust (SADT)). The different systems of land tenure in the SADT areas include ownership and deeds of grant, leasehold, Permission to Occupy (PTO) Certificates, building permits and trading permits. However, the

occupation of land where Trust tenure applied was principally based on the PTO system (Manona *et al*., 2010; Weideman, 2004). After the promulgation of the Bantu Authorities Act of 1951, traditional leaders played a major role in terms of land allocation (Ntsebetza, 1999). The process of issuing PTO certificates started with the chief and headmen allocating land, where after agricultural officers surveyed the boundaries of sites and fields, before the magistrate allocated the PTO certificate. Registers of permit holders were to be kept at the magistrates' offices (Cousins, 2008). Thus, although the headmen or tribal councils were directly involved in the land allocation process, the allocation was not valid until the commissioner issued a PTO certificate (Smith, 2008). According to Ntsebetza (1999) the holder of a PTO agreement was guaranteed permanent occupation of the land, but was still vulnerable. Cousins (2008) explains that the security of individual rights in communal systems was weakened in several ways under apartheid. Some of the ways through which individual rights were weakened include "a one-man-one-lot requirement, restrictions on plot size, a rigid system of male primogeniture to govern inheritance, and non-recognition of women's land rights" (Cousins, 2008). In terms of regulations, PTO's cannot be sold and are not inheritable. It can only be issued to men, or to elderly widow of a male holder (Cousins, 2008). Since government was the nominal owner of the land (Ntsebetza, 1999), officials were given extensive powers to appropriate land and to cancel PTOs (Cousins, 2008). Such insecurity contributed to financial organisations not recognising PTOs as collateral for formal credit (Ntsebetza, 1999). Interestingly, the pre-1994 system of issuing PTO certificates is still in place in some areas and provinces within South Africa (Cousins, 2008)

Since the 1990s, a number of policies were introduced aimed at overcoming the racial imbalance that was caused by the historical marginalisation of black Africans. Hall (2010) describes two distinct cycles of land policy in South Africa since the 1990's. The first cycle range from 1990 to 1997 and "embraced much more explicitly a language of radical restructuring and transformation of class relations, [but] it lacked any real provisions to realise this vision" (Hall, 2010). Within the second cycle (1998 to 2004), the vision shifted towards deracialising of the existing commercial farming sector, through the settlement of a new black capitalist farming class.

The first cycle of land policy started with the removal of the ban on the African National Congress (ANC). In the period between 1990 and 1994 proposals for land reform were highly disparate, but were brought together under a unified policy through years of negotiations (Hall, 2010). In 1994, a land reform programme was implemented in South Africa in order to redress the racial imbalance in ownership of land, and to secure the land rights of the previously marginalised groups of people. The legal basis for land reform is set out in the Bill of Rights in the Constitution of the Republic of South Africa (Lahiff, 2002). The land reform programme was pursued through four processes, namely restitution, redistribution, tenure reform, and by providing funding and other resources to support the emergence of black farmers. More

specifically, restitution refers to the returning of land to people who were dispossessed under apartheid, or providing a cash equivalent to those people (CDE, 2008). The legal basis for restitution was created under the Restitutions of Land Rights Act (Act 22 of 1994) (Lahiff, 2002). According to the Restitution Act, a person has the right to restitution if he/she, or a direct descendant to the entitled person, was dispossessed of a right in land after the 19th of June 1913 (the specific date of the enactment of the Land Act of 1913) (Rudman, 2009).

Redistribution refers to the transfer of land to the landless poor, labour tenants, farm workers and emerging farmers. Such land can be used for residential and/or productive purposes that will contribute to improve the livelihoods of the beneficiaries. Lahiff (2002) notes that, until 2001, land redistribution have mainly been achieved through the provision of the Settlement/Land Acquisition Grant (SLAG). The focus of SLAG was on the poor with only households with a monthly income of less than R1 500 qualifying for the grant. Since 2001, however, a new programme was introduced that aimed at promoting commercial-oriented agriculture. The new programme, Land Redistribution for Agricultural Development (LRAD), requires from applicants to make an own contribution of at least R5 000 to qualify for grants between R20 000 and R100 000 (Lahiff, 2002). The LRAD programme thus removed the income ceiling that excluded the more well-off black households from benefitting from land redistribution (Hall, 2010). According to Lahiff (2002), the Provision of Certain Land for Settlement Act (Act 126 of 1993) remains to be the legal basis for land redistribution. The Act was amended in 1998 and is now titled the Provision of Land and Assistance Act.

Tenure reform refers to the modernising of land tenure rules and access to land ownerships (CDE, 2008). According to CDE (2008), tenure reform is a constitutional obligation since the constitution states that a person or community who has legally insecure tenure due to past racially discriminatory laws or practices, is entitled to tenure that is legally secure, or to comparable redress. The aim of farm tenure reform is to balance the rights and interests of land owners and occupiers (Cousins and Hall, 2011). The first legislative component of tenure reform is the Upgrading of Land Tenure Rights Act (Act 112 of 1991) (as amended). This Act provides for the conversion of informal land rights into formal ownership rights (title deeds or deeds of grant) (Lahiff, 2002). During the period between 1994 and 1998, tenure reform focussed mainly on securing the rights of labour tenants and farm workers, and to create a new form of legal entity for holding land in common (Cousins and Claassens, 2004). The period saw an active pursued by government to establish laws and programmes to achieve the above outcomes. The key tenure legislation since 1994 include the Land Reform (Labour Tenants) Act (Act 3 of 1996), Communal Property Association (CPA) Act (Act 28 of 1996), Interim Protection of Informal Land rights Act (Act 31 of 1996), Extension of Security of Tenure Act (ESTA) (Act 62 of 1997), and The Transfer of Certain Rural Areas Act (Act 94 of 1998) (Cousins and Claassens, 2004).

The Land Reform (Labour Tenants) Act and the Extension of Security of Tenure Act were passed to implement tenure reform in commercial farming areas (CDE, 2008). The Land Reform (Labour Tenants) Act regulates tenancy terms for those who have historically worked on farms in return for access to their own land for the purpose of using it for agricultural activities. The Act affirms the rights of such labour tenants to continue to use the land, and also specifies the procedures through which such rights can be legally terminated (Cousins and Hall, 2011). The Act also provides a claims process that can be used by labour tenants to acquire full ownership of the land they occupy (CDE, 2008). In essence, the Land Reform (Labour Tenants) Act thus protects the land rights of labour tenants on privately-owned farms (Cousins and Claassens, 2004). The aim of the Extension of Security of Tenure Act (ESTA) is to protect dwellers on privately owned land against arbitrary eviction. The Act also allows for farm workers to upgrade their rights over such land from tenancy to freehold (CDE, 2008) through mechanisms for the acquisition of long-term tenure security (Cousins and Claassens, 2004).

The Communal Property Associations Act is the result of the fact that government wanted to enable the communities that would have their land claims granted, to have the opportunity to assume legal personality, and co-owning and managing the restituted land (Rudman, 2009). The CPA Act provides for the establishment of a Communal Property Association (CPA) as a legal land holding entity (Ntsebeza, 1999). Rudmann (2009) argues that the establishment of a CPA "instituted a way of formalising customary rights in land held by groups under the informal system of customary tenure mainly after receiving land titles under the Restitution Act". In terms of the CPA Act, the CPA has all the rights and full private ownership of the land (Cousins and Hall, 2011). The primary intension of CPAs was to be used by beneficiaries of land restitution and redistribution programmes, as an alternative to the commonly used trusts. The reason for searching for an alternative to trusts is that the trustees of a trust have too much control compared to the members of the land-holding group (Cousins and Hall, 2011). The CPA Act does not prescribe the rules and procedures for decision-making and land allocation, nor the manner in which the CPA Committee should be constituted. The majority of the membership of the CPA must decide on land allocation. The only condition is that the legal entity must conform to the requirements of the Bill of Rights in the Constitution of the Republic of South Africa (Ntsebeza, 1999).

The Interim Protection of Informal Land Rights Act was intended as a temporary measure to secure the rights of people who are occupying land without any formal documentary rights, pending the introduction of more comprehensive reform (Cousins and Claassens, 2004). Cousins and Claassens (2004) continue stating that the Act has been extended annually since legislation for more comprehensive reform has not yet been introduced. The Transformation of Certain Rural Areas Act provides for the repeal of the Rural Areas Act 9 of 1987 that applied to coloured reserves in the Western Cape, Northern Cape, Eastern Cape, and the Free State

(Lahiff, 2002). The primary aim of the Act is to deal with the control of commonage land and to provide for the transfer of township land to a municipality (Cousins and Claassens, 2004).

According to Cousins and Claassens (2004) the focus of attention after 1998 has been a new law to provide improved security of tenure in communal systems. This change in focus of attention corresponds to the start of the second cycle of land policy-making as described by Hall (2010). In 1998, the drafting of the Land Rights Bill (LRB) was initiated in an attempt to embody the principles of tenure reform that was set out in the White Paper of Land Policy of 1997. Within the LRB, the land rights were vested in the members of group systems, rather than in legal entities, the chieftaincy or tribal authorities. The members of the group had the right to choose what organisation should manage and administer the land rights on their behalf. While the paradigm underlying the LRB was to transfer the ownership to the rightful owners, inherent difficulties hampered the transfer of the ownership. A key question in this regard was to define the unit of ownership in communal areas to determine whether the ownership should be transferred to tribes, nations, wards, villages, or to groups at tribal authority level. The unit of ownership have a major impact on the ability of different groups within the bigger group to influence decision-making with regard to the land. Cousins and Claassens (2004) argue that these questions derive from the nested and hierarchical nature of land rights in communal systems. Consequently, the LRB of 1999 did not adopt a paradigm of transferring the title. Rather, the drafters of the LRB moved towards a paradigm based on statutory rights which are secure rights but do not convey full ownership. The Minister of Land Affairs would continue to be the nominal owner of the land, albeit with strictly delimited powers. The holders of the rights would be the key decision makers with regard to the land and they would derive the full benefit from using the land. The rights would vest in the individuals who use or occupy the land, or who have access to the land. However, within group systems, these rights would be subject to those shared with others in the group. Individual rights thus would be relative to “group rights” as decided upon by the majority of the members of the group (Cousins and Claassens, 2004).

A new Minister of Agriculture and Land Affairs was elected in June 1999 who viewed the LRB to be too complex and costly to implement, and that it assumed that the state would protect the people’s rights on their behalf. Consequently all work on the LRB was stopped. Instead, a Communal Land Rights Bill was drafted that appeared to privilege traditional leaders. The Bill allowed traditional communities operating under customary law, as well as authorised representatives (chiefs), to be recognised as juristic persons for the transfer of state land in full ownership. After a number of debates on earlier drafts of the Bill with regard to, amongst others, the power of traditional authorities, and the inadequate security of women’s rights, some amendments were made and the Act was passed in 2004 as the Communal Land Rights Act (Act 11 of 2004) (CLARA) (Cousins and Claassens, 2004). The overall objective of the Act is to secure tenure by transferring land to communities and converting “old order rights” to “new order rights” (Smith, 2008). It is noted, however, that the Act was never actually promulgated

due to the controversial content, especially with regard to the administrative structure set up under it (Rudman, 2009). In order to address the question of the power of traditional authorities, the final version of the law contains a definition of "land administration committee" without specifying that the committee will be the traditional council whenever such a council exists. An earlier draft specified that, in cases where traditional councils exist, such councils will perform the function of the land administration committee. Cousins and Claassens (2004), however, argue that, the fact that the final version of the law does not specify clearly that an alternative structure (i.e. an elected committee) may administer the land, it is open to competing interpretations. Rudman (2009) too argues that the way in which the two relevant sections (Section 21 subsection 2 and Section 22 subsection 2) are written in CLARA may imply that the traditional leaders will have the right to govern the communal land if such a council of traditional leaders exist in the specific community. In order to address the question of women's rights, one amendment provides that "old order rights" are deemed to be held by all spouses in the marriage rather than by the husband alone. No provision, however, was made for single women (widows, or unmarried women), and no requirement was included that land administration committees should allocate land to women on the same basis as men (Cousins and Claassens, 2004). Rudman (2009) also indicates that, if the land is governed by a land administration committee (i.e. if there is no traditional council as spelled out in section 21(2) of the Act), CLARA provides that only one third of the total membership of the committee has to consist of women, instead of a "fifty percent rule" which would have implied sincere protection of women's rights.

Given the above mentioned concerns, CLARA remained to be controversial. Claassens and Cousins (2008) edited a book that comprehensively assesses the Act in terms of the controversies. All of the authors were critical to the core provisions of the law and argued that such provisions will exacerbate, rather than reduce, tenure insecurity. The validity of CLARA was also challenged in 2006 in a case in the North Gauteng High Court (the High Court). The applicants argued, amongst others, that by giving traditional leaders undemocratic and unprecedented powers, CLARA actually undermines security of tenure; that CLARA allows traditional councils (that are not democratically elected) to become land administrators and sell land with the permission of the land rights board; and that CLARA therefore will make the tenure of the majority of women in the former homelands more insecure (Rudman, 2009). In October 2009 the High Court declared various provisions of CLARA invalid. It was judged that section 21(2) of CLARA infringes on the right of equality as set out in the constitution. The judge argued that some of the existing traditional councils had not been elected democratically, and the interest of women may not be represented in such a council (Rudman, 2009). The High Court, however, failed to declare CLARA invalid for failure to enact it in accordance with the correct procedure. On 11 May 2010, however, the Constitutional Court judged CLARA to be unconstitutional and invalid in its entirety for failing to comply with the procedures for enactment as set out in the Constitution. Given that the CLARA was judged invalid and unconstitutional in

its entirety, the judge indicated that it is unnecessary to consider whether its provisions are consistent with the Constitution (Constitutional Court of South Africa, 2010).

It is within this legislative backdrop that land tenure systems currently apply on smallholder irrigation schemes in South Africa. Given that secure tenure is a crucial condition for economic development (Weideman, 2004), the understanding of the degree of security of tenure associated with the different tenure systems that apply at the respective case studies is crucial to really understand the institutional environment within which the farmers operate.

Laws related to production and marketing of agricultural products

Other significant policies that have been enacted into laws by the South African government since 1994 include the Marketing Act of 1996; and the National Water Act of 1998 (Mbatha, 2007). The objectives of the new laws were to promote efficiency and development in agriculture, redistributing agricultural resources, and the efficient management of environmental water. Compared to the difficulty in obtaining information on property rights and land tenure, documents containing information on the regulations that relate to the production and marketing of agricultural products are easier to access since most of it is available for public viewing.

The Marketing of Agricultural Products Act (Act no 47 of 1996) specifically has the political aim to increase market access to all participants, to promote efficiency of marketing products, to optimise export earnings from agricultural products and to enhance the viability of the agricultural sector. The National Water Act (Act no 36 of 1998) again makes provision for the establishment of catchment management agencies and water users associations to manage water resources at basin-level. While the government still remains the custodian of the water resources in South Africa a lot of the regulatory functions have been transferred to these institutions. In terms of the act, water rights are granted in the form of user rights rather than being based on the existence of land rights.

Another act that was promulgated relates more to emerging farmers in South Africa. The Land and Agricultural Development Bank Act (Act No. 15, 2002) was promulgated to facilitate access to rural finance for emerging farmers by altering the mandate of Land Bank to provide services to emerging farmers who were previously excluded. All of these formal rules and regulations have an impact on the way agricultural production and marketing is conducted in South Africa. Other industry specific formal rules and regulations may be applicable and should also be identified and included in such an analysis.

Informal institutions

The informal constraints of the institutional environment include norms of behaviour, conventions, self-imposed codes of conduct (North, 1994), and non-political, non-economic and unwritten conventions such as taboos and traditions (Milagrosa, 2007). These aspects are also embraced within the context of social capital.

3.3.2.3 Governance structures (Level 3)

The third level of the NIE framework is concerned with governance structures and is often also referred to as the "play – or organisation – of the game" (Milagrosa, 2007). Governance structures refer to the way in which a transaction is organised within the rules and regulations as defined by the institutional environment. Williamson (1998) notes that "the concept of governance is precisely responsive to the triple to which Commons referred" since "governance is the means by which *order* is accomplished in a relation in which potential *conflict* threatens to undo or upset opportunities to realize *mutual* gains."

Governance structures can best be described along a spectrum (Shelanski and Klein, 1995). Three types of governance structures are generally distinguished (Williamson, 1985). At the one end of the spectrum lies a purely anonymous spot market, while the other end of the spectrum consists of hierarchy or vertical integration. Between those two modes of governance lies a variety of hybrid modes such as contracts and partial ownership (Williamson, 1985; Shelanski and Klein, 1995; Peterson, Wysocki and Harsh, 2001). Figure 3.3 presents the spectrum of governance structures (Peterson *et al*., 2001).

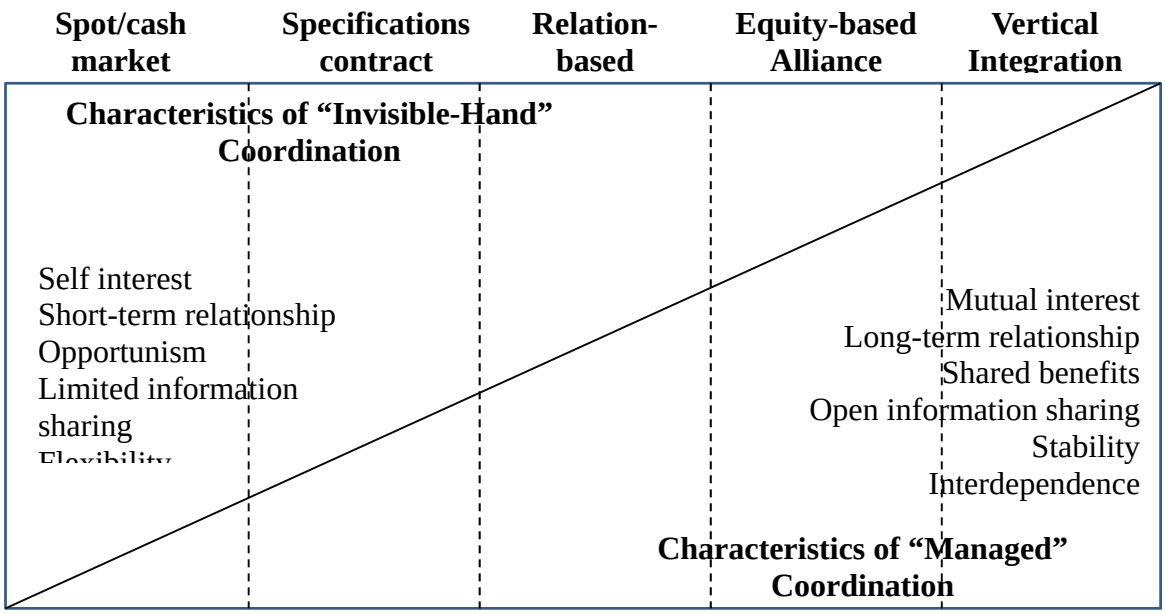

Figure 3. 3: The continuum representing the respective strategic options for vertical coordination.

Source: Peterson *et al*. (2001)

Note: The diagonal line represents the mix of invisible-hand and managed coordination characteristics found in each of the five alternative strategies for vertical coordination. The area above the diagonal indicates the relative level of invisible-hand characteristics and the area below the diagonal indicates the relative level of managed characteristics.

Within the spot market as a mode of governance, the market price provides incentives for the exploitation of profit opportunities. Individuals can quickly and autonomously respond to market signals. The market typically will be the efficient mode of governance when the underlying transaction is concerned with low levels of asset specificity (Williamson, 1985; Shelanski and Klein, 1995). Shelanski and Klein (1995) argue that bilateral coordination or even joined ownership may be more desirable whenever more specialised assets are at stake in the transaction, or in the presence of thin product and input markets. Hierarchy, otherwise referred to as vertical integration, refers to the situation where trading parties are under unified ownership or control. The level of asset specificity plays a major role in the decision whether or not to integrate vertically. The higher the level of asset specificity, the higher is the need for vertical integration.

There are hybrid forms of organisation that deal with bilateral dependency without going so far as vertical integration. Ownership autonomy is preserved, although there are some safeguards to protect parties from opportunistic behaviour by other parties. Peterson *et al*. (2001) provide a thorough discussion of the different hybrid modes of coordination along the continuum. Specification contracts are legally enforceable establishments of specific and detailed conditions

of exchange. Within relation-based alliances the firms involved in the relationship share risks and benefits that emanate from mutually identified objectives. Peterson *et al*. (2001) cite Martin *et al*. (1993), who argue that a strategic alliance is relation-based if parties mutually identify objectives, mutually control the decision-making process and mutually share the risks and benefits. The next level of vertical coordination is referred to as equity-based alliances. Equity-based alliances differ from relation-based alliances through the presence of a formal organisation that has an identity distinct from the exchange actors, and that is designed to be their joint agent in the conduct of the transaction. The different types of hybrid governance structures differ mainly in terms of the intensity of control, which increases the further you move to the right in Figure 3.3.

The number of different modes by which a transaction can be organised emphasises the need to thoroughly assess the different modes of governance in order to identify the most efficient governance structure for the specific transaction under consideration.

3.3.2.4 Resource allocation and employment (Level 4)

The fourth and final level of the NIE framework is concerned with the allocation of resources and employment (Williamson, 1998). At the level of resource allocation, market performance is evaluated with special reference to the quantities produced and marketed, production and marketing costs, and price analysis in the form of farmer's and traders' share of total market sales (Milagrosa, 2007). Level 4 is analysed with neoclassical economic theory in the form of marginal analysis, where the firm, again, is described as a production function (Williamson, 2000) rather than a governance structure. Weintraub (undated) summarises the framework of neoclassical economics as follows: "Buyers attempt to maximise their gains from getting goods, and they do this by increasing their purchases of a good until what they gain from an extra unit is just balanced by what they have to give up to obtain it. In this way they maximise 'utility' – the satisfaction associated with the consumption of goods and services." Similar to the view from buyers, producers, again, attempt to produce respective units of a good until the cost of producing the incremental or marginal unit (marginal cost) is just balanced by the additional or marginal revenue it generates (marginal revenue). Profit is maximised at the exact level where the marginal cost equals the marginal revenue.

Neoclassical economics is thus concerned with the allocation of resources in an optimal manner, which is the level where profit and/or utility are maximised. By definition, optimal allocation of resources implies that the resources are allocated efficiently. The concept of efficiency is the most widely used concept in economics (Haji, 2008). In general it is measured by comparing the observed output against the feasible (or optimal) output. The importance of efficiency to economics is centred around the scarcity of resources.

One can distinguish between different types of efficiency. Two important forms of efficiency include technical efficiency and allocative efficiency. The concept of technical efficiency refers to the ability of the producer to produce maximum output from given level of inputs (Haji, 2008). Another definition of technical efficiency refers to the difference between the observed level of production and the optimal level of production (or the production frontier). A firm will thus be considered to be technically efficient only if the output produced is the maximum that can be produced from the given level of input given his technology set. Allocative efficiency, on the other hand, measures the ability of the producer to use inputs in optimal or profit maximising proportions, given specific factor prices (Haji, 2008). A firm can thus be considered to be allocative efficient if it applies inputs at such a level where the marginal change in total revenue from using the additional unit of input (or marginal value of product) is equal to the marginal change to total factor costs due using the additional unit of the input (marginal factor costs) (Haji, 2008). Given the definitions of the concepts of technical and allocative efficiency, if a firm has achieved both technical and allocative efficiency, it may also be considered to be economically efficient. Alene (2003) argues that technical and allocative efficiency are important in developing countries, since increasing technical and allocative efficiency are important factors of productivity growth.

3.3.3 DISCUSSION AND CONCLUSIONS

From the above discussions, it is evident that there are definite similarities between the SCP approach and the NIE approach of Williamson (2000). Milagrosa (2007) argues that the complementary overlapping characteristics of the two approaches contribute to a more comprehensive analysis of the sector under consideration. Both approaches are based on the notion that the different levels affect each other. The higher levels provide constraints that influence the functioning of the lower ones, while the lower levels provide feedback to the higher levels in the long run.

In addition to similarities in the overall functioning of the two approaches, there are also some similarities between the individual components of the two approaches. More specifically, there are similarities between the structure component of the SCP and the institutional environment of NIE, between the conduct of SCP and the level of NIE that is concerned with governance structures, and lastly, between the performance component and the resource allocation level of NIE. The institutional environment (Level 2) plays a significant role in shaping events at the levels of downstream governance and resource allocation. By representing the formal rules and informal constraints that regulate the way transactions are conducted, (Williamson, 2000) argues, “institutions form the incentive structure of a society, and the political and economic institutions, in consequence, are the underlying determinants of economic performance” (North, 1994). The structure component of the SCP, again, influences the way economic agents behave (conduct) by providing the physical environment within which the value chain players operate

(CEAT, 2003). The integrated approach thus allows for considering both the physical and institutional environment within which the economic agents within the sector have to operate. The major difference between the structure component and the institutional environment is that, while the institutional environment refers to intangible aspects (formal rules and informal constraints) (Milagrosa, 2007), structure is concerned with tangible aspects such as the region, topography, the distribution of land, land ownership and tenure, distance from input and product markets, and the road infrastructure that connects farms to markets (CEAT, 2003).

Both the conduct component of SCP and the governance structures of NIE focus on the way in which value chain players operate within the value chain in reaction to the physical and institutional environment specified at the higher levels. The governance structures refer to the specific way in which transactions between the different parties are organised. The type of governance structure used is influenced by the institutional environment within which it was formed (Milagrosa, 2007). Conduct goes beyond the organisation of the transaction by referring also to the production and marketing behaviour of the economic agents within the farm and market structure as defined by the structure component of SCP (Milagrosa, 2007; CEAT, 2003). Conduct is concerned with cropping practices, farming techniques, sources and availability of credit, the sources and availability of market information, the way prices are determined, competition and contracting, and the marketing strategies that are used (CEAT, 2003). The major similarity between conduct and governance is that both components aim to create order in the transaction under consideration (Milagrosa, 2007).

The similarity between the resource allocation level of NIE and performance of SCP lies therein that both are concerned with measuring the efficiency of the behaviour of the agents within the social, physical and institutional environments as determined in the higher levels of the integrated framework. Both components are concerned with prices, margins, and costs. The performance of value chain players is expressed in terms of quantities produced, the value of sales, costs, and also the margins at the different stages along the value chain (CAET, 2003). Resource allocation is concerned with marginal analysis to analyse productive and allocative efficiency (Milagrosa, 2007).

The high levels of similarity, combined with some distinct differences between the two approaches, lead to the conclusion that the integrated framework allows for a more comprehensive analysis of the value chain under consideration. Given the complexity in South Africa, which exhibits two distinct economies that developed in different social and institutional environments, such an integrated research framework may contribute substantially to providing a comprehensive understanding of the agri-food systems within which emerging farmers are to be integrated.

While the theoretical description of the integrated framework allows for intuitively grasping the advantages of using the integrated framework to analyse the value chains in this study, the real advantage can be better described by explaining how the recommended framework may contribute to overcoming the stumbling blocks that were identified in the literature review. The analysis of the social embeddedness level will contribute to a better understanding of the levels of trust in the community as part of the social capital analysis. Lack of trust was identified as one of the stumbling blocks that contribute to the high transaction costs that exclude farmers from participating in commercial agri-food chains. A better understanding of the trust levels may contribute to improving the relationship between the different value chain participants, and hence may help the farmers to successfully participate in the value chain. The analysis of the social embeddedness will also provide insight into the role that is played by traditional authorities in the communities. Keep in mind that traditional authorities are often responsible for allocating land in communal areas, and that insecure land tenure is also listed as a major stumbling block that contribute to the exclusion of emerging farmers from commercial agri-food chains. The understanding of the role of the traditional authorities in the respective case studies may provide insight into the potential to increase tenure security.

Within the analysis of the institutional environment, more important information will be obtained with regard to the security of tenure. The consideration of the legal aspects, and hence the constraints, associated with the tenure systems that apply is a major component of the analysis of the institutional environment. A comprehensive understanding of the existing tenure systems will contribute to an understanding of the environment within which the farmers operate, the potential for prosperous farmers to be able to expand their production enterprises by buying or renting additional land, and it can also be used in negotiations with financial organisations to possibly develop a financing product that will allow emerging farmers access to formal credit. The small scale of operations and the lack of access to credit were listed as major stumbling blocks that contribute to the exclusion of emerging farmers from participating in commercial agri-food chains.

The analysis of the governance structures is concerned with finding the optimal vertical coordination strategy that will contribute to reducing the transaction costs faced by the farmers. The review of the literature on the factors that constrain the ability of emerging farmers to participate in commercial agri-food chains, shows that high transaction costs are considered to be a major barrier that exclude emerging farmers from commercial agri-food chains. The contribution of the analysis of the governance structures thus lies in the identification of a potential solution to overcome the problem of high transaction costs that exclude the farmers from commercial agri-food chains. Given that NDP (2011) also recommends the identification of potential partners in agro-processing that can support the farmers, the optimal degree of vertical coordination that results from the analysis of governance structures will ensure that the partnership will be based on the optimal degree of coordination between the farmers and such a

company, rather than merely forcing farmers into a relationship with an agro-processing company that may act opportunistically at their expense. It is also noted that the fact that there are a number of different types of formal relationships that can be formed between farmers and such processing companies, policy recommendations that farmers should enter into strategic partnership relationships with agro-processing companies (CRDP, 2010) may be an over simplified solution to a very complex problem.

The analysis of the resource allocation level is concerned with the degree of efficiency with which resources are used. While NDP (2011) recommends that the focus of research and development for the agricultural sector has to be on new technology due to the historical benefits associated with the ability to adapt highly sophisticated technology to South African conditions, it has to be recognised that emerging farmers typically exhibit low levels of human capital and financial capital that are required to adopt sophisticated new technology. The focus of research and development efforts only on sophisticated new technology may mean that emerging farmers do not benefit from investment in research and development. Moreover, cash flow constraints due to the lack of access to credit contribute further to the inability of the farmers to apply the recommended levels of production inputs to produce maximum yields. Efficiency analysis provides valuable insight into the degree to which farmers should be able to improve their performance at their current input levels, and within their current technology set. Thus, while most of the stumbling blocks are caused by the very nature of being start-up farmers, or relate to institutional failure, efficiency analysis shows the potential for improvement even in the presence of existing constraints.

The qualitative description of the physical environment (structure), the way people behave within the physical environment (conduct), and the level of performance of the farmers through the SCP-analysis, will provide important information on the current situation in the respective case studies. The analysis of the structure is concerned, amongst others, with the condition of the physical infrastructure (i.e. road networks), the identification of all role-players in the value chain, and the location of the markets. Conduct analysis includes an analysis of the sources and availability of credit to the farmers, and the sources and availability of market information. The analysis of the performance-component then gives an indication of the level of performance of the farmers given the way they currently behave in their existing environment. All of these focus areas within the SCP-analysis were also listed a constraints that contribute to exclude emerging farmers from participating in commercial agri-food chains. The SCP-analysis thus provides a form of situation analysis to highlight the stumbling blocks that are present in the respective case studies and constrain the ability of the farmers to participate successfully in the intended commercial agri-food chains.

From the above discussion it is evident that the integrated NIE and SCP framework has some major advantages with great potential to generate possible solutions that may contribute to the

successful integration of emerging farmers into commercial agri-food chains, and hence to meeting the vision for 2030 of the NPC of South Africa. The next section covers a discussion of the methods used to investigate the value chains within which emerging farmers are to be integrated.

3.4 METHODS OF ANALYSIS

The aim of this section is to present and discuss the data requirements and procedures for analysing the respective value chains in a holistic manner, which will give insight into the functioning of the value chain within which the emerging farmers are to be integrated. The section starts with a discussion of the data and procedures for conducting an SCP analysis to get a good understanding of the way economic agents currently behave and perform within their physical environment. Then follows a discussion of the data requirements and procedures for the NIE analysis to give insight into the reasons why the economic agents behave the way they do. After the NIE analysis follow the procedures to map the product flow, and the distribution of value and water flow as the product moves from the farm to the end consumer. The procedures for analysing critical points that act as stumbling blocks to the emerging farmers are discussed next, followed lastly by the procedures for modelling the potential impact of interventions that are recommended to overcome such stumbling blocks.

3.4.1 APPLICATION OF STRUCTURE-CONDUCT-PERFORMANCE ANALYSIS

The SCP analysis contains both qualitative descriptions, as well as some quantitative analyses. Primary and secondary data are used for the purpose of the SCP analysis. Primary data are obtained mainly from personal interviews with key role-players within the value chain under consideration, as well as a questionnaire[1] survey to obtain more in depth information on a micro level. Secondary data are obtained from published reports and other documents based on the value chain under consideration.

Assessing the farm structure consists of a qualitative description of the physical characteristics of the region (i.e. topography; size of population; proportion of the population that is involved in agricultural activities; the main crops that are produced in the region; and the total land area in the region), land ownership and tenure, as well as the size and distribution of land (Milagrosa, 2007; Allen *et al.*, 1999). The description of the physical characteristics of the region can be obtained from secondary data sources. Information on land ownership and tenure, and the size

[1] The primary data that was obtained from the questionnaire survey is available from the Department of Agricultural Economics, University of the Free State, Nelson Madela Drive, Bloemfontein.

and distribution of land amongst farmers in the study area is obtained from the micro-level data gathered by means of questionnaire surveys.

The market structure is assessed in terms of a qualitative description of the different marketing channels that are available; the different actors in the market; the location of input and product markets; the condition of road networks to deliver produce to the markets; and the marketing infrastructure (Allen *et al.*, 1999; Hai, 2003; Milagrosa, 2007). It is noted that the aim of the analysis of the market structure is not to assess the market structure of the whole sub-sector, but rather to get an idea of the structure only in that part of the chain where the specific farmers are to be integrated. Information for the purpose of analysing the market structure is obtained from interviews with key role-players and the questionnaire survey.

The assessment of production and marketing conduct consists of a qualitative description of the behaviour of the actors within the value chain under consideration. Production conduct is concerned with cropping practices of the individual farmers; the farming techniques that they employ; and also the sources and availability of credit (Milagrosa, 2007). Since production conduct is mainly concerned with the behaviour and decisions of individual farmers, information to assess farm conduct is obtained from the questionnaire surveys.

The aspects that are considered when assessing the marketing conduct include, amongst others, the sources and availability of market information; the methods whereby prices are formed; investment in new technology; research and development of new products; investment in technical training and services; the types of contracts used; and the marketing strategies that are used (CAET, 2001; Milagrosa, 2007). Information on research and development of new products and investment in technical training and services can be obtained from interviews with key role-players in the value chain. All of the other aspects are assessed from micro-level data obtained by means of questionnaire surveys.

The analysis of the performance by the different actors in the value chain consists both of qualitative descriptions, as well as some quantitative analyses. It consists of a qualitative description of the quantities of the crops produced, and also of the costs, sales and income of the farmers and that of the other actors along the value chain (Hai, 2003; Milagrosa, 2007). Quantitative analyses that are used to assess performance include the analysis of marketing margins at the different stages along the value chain. The marketing margin is the difference between prices paid at different stages of the marketing process (Milagrosa, 2007). Based on this definition, one can for example distinguish between farm-gate and wholesale margins, and also between wholesaler and retailer margins. A total margin can then also be measured by computing the difference between prices received by producers at the farm gate and the prices consumers paid the retailer for the product.

After the application of the SCP analysis, one has a comprehensive understanding of the current situation within which the farmers and other agents operate. The NIE analysis provides more insight into the reasons why the actors behave the way they do. The data requirements and procedures to conduct a NIE analysis are discussed next.

3.4.2 APPLICATION OF NEW INSTITUTIONAL ECONOMICS ANALYSIS

Within the NIE analysis, the levels of social embeddedness are assessed to gain insight into the social environment as a factor that influence the behaviour of the agents, followed by an analysis of the institutional environment that provides the regulatory framework within which the agents operate. The way transactions are organised is assessed within the third level, which is concerned with governance structures, followed by analysis of the levels of efficiency with which resources are used by the economic agents under consideration.

3.4.2.1 Social embeddedness (Level 1)

From the literature it seems that measuring social capital proves to be a challenge and Milagrosa (2007b) provides three possible reasons. Firstly she argues that social capital perceptions are highly subjective and it is “difficult to narrow down the subtleties of the population and to reduce the value of connectedness of a community to a number”. The second reason centres around the fact that social capital is extremely dynamic and volatile since social capital dissolves once the ties between participants are broken. Social capital also needs to be renewed and used continuously otherwise its level will decrease. As the final reason, Milagrosa (2007b) states that trust, shared norms, beliefs and social networks cannot be entered into any formal written agreement, which, in combination with the fact that it is intangible, makes it extremely difficult to measure (Ostrom, 2000; Dasgupta, 1988, as cited by Milagrosa, 2007).

Despite of the challenge of measuring social capital, Milagrosa (2007b) states that various approaches have been used to measure it. According to the World Bank, however, no standard measure of social capital can ever be achieved, since the respective measurements are dependent on the definitions employed by the researchers. Milagrosa (2007b) concludes furthermore that no single approach is superior to another.

Krishna and Shrader (2000) developed a framework that can be followed to measure social capital. The framework is shown in Figure 3.4.

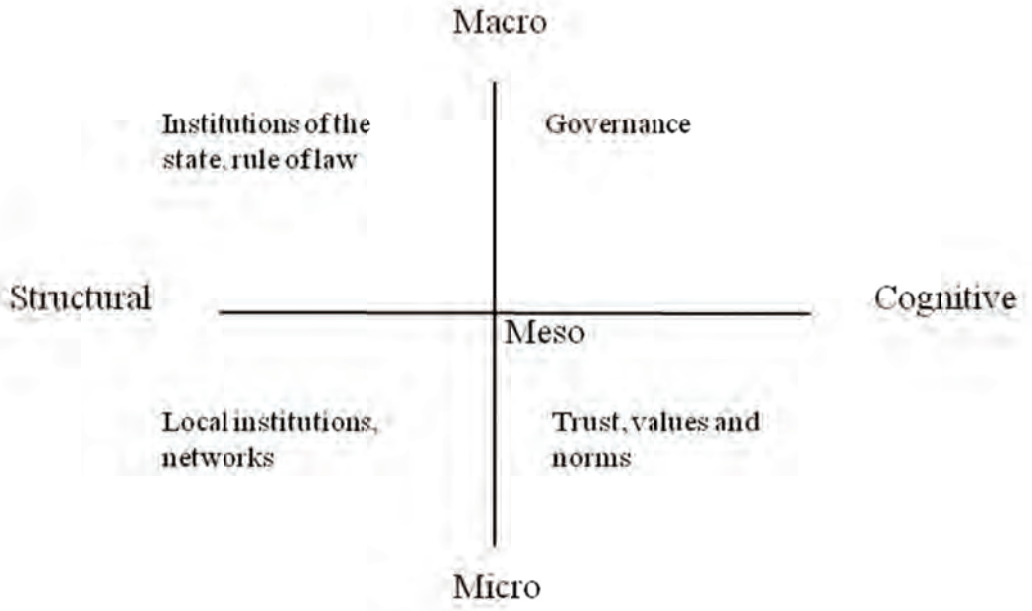

Figure 3. 4 Forms and scope of social capital.
Source: Grootaert and Bastelaer (2002)

The first concept in Figure 3.4 is structural social capital. Structural social capital is tangible and deals with formal institutions. The level of structural social capital depends on membership of formal networks or local organisations such as churches, sports clubs or local government. The second concept is cognitive social capital and this is perceived to be embedded within people in the form of trust, local ethics, tradition and morals. By definition, cognitive social capital is thus intangible. Figure 3.4 also shows that measurement of social capital occurs along three dimensions, from the micro dimension, through the meso to the macro dimension. While the micro dimension captures horizontal networks and norms that motivate such associations, the meso dimension describes both horizontal and vertical interaction. The macro dimension again focuses on the wider institutional and political sphere.

When investigating levels of social capital, Krishna and Shrader (2000) suggest that one should first analyse the indicators of structural and cognitive social capital independently. Thereafter, the two can be aggregated and analysed together.

3.4.2.1.1 Structural social capital

Recall that the structural social capital component is tangible and only refers to the respondent's membership of formal organisations. Respondents are asked in the questionnaire whether they are active members of, for example, a religious group, political party, farmers' co-operative, etc.

The more organisations the respondent is an active member in, the higher his level of structural social capital. The structural social capital index is thus:

$$SSC_{ij} = \sum_{j=1}^{J} membership_{ij}$$

where SSC_{ij} refers to the structural social capital of farmer *i* in municipality *j*, and $membership_{ij}$ refers to membership of farmer *i* in municipality *j* to the various organisations presented in the questionnaire.

3.4.2.1.2 Cognitive social capital

In order to measure the respondent's level of cognitive social capital, a 5-point scale can be used in the questionnaire to obtain information on all items necessary to measure cognitive social capital. The individual value for cognitive social capital indicators $\frac{SCIndicator_{ij} - 1}{4}$ is used, where *ij* refers to the cognitive social capital dimension of farmer *i* in municipality *j*. The product is multiplied by a factor representing the within group weight (*wgw*) of the variables being analysed. The within group weight depends on the number of items included in the measurement of the specific indicator. The total level of cognitive social capital is then calculated by adding the individual values of the cognitive social capital indicators together. Cognitive social capital therefore is:

$$CSC_{ij} = \sum_{j} \left(\frac{SCIndicator_{ij} - 1}{4} * wgw \right)$$

3.4.2.1.3 Social capital index

Once the structural and cognitive social capital levels have been analysed individually, an overall social capital index is calculated by adding the cognitive and structural social capital together, as shown in the following equation:

$$SCI_j = CSC_{ij} + SSC_{ij}$$

where SCI_j is the social capital index, CSC_{ij} is the cognitive social capital of farmer *i* in municipality *j*, and SSC_j is the structural social capital index of municipality $_j$

The social capital index thus contains information on both the respondent's structural social capital and his/her cognitive social capital. The social capital index can then be used in further regression analyses to determine the influence of social capital on whatever decision is under consideration (i.e. on the decision as to what governance structure to use when marketing vegetables).

3.4.3 INSTITUTIONAL ENVIRONMENT (LEVEL 2)

The institutional environment is concerned with answering the question as to how the production and marketing of the specific crop under consideration is conducted (Milagrosa, 2007). Information on the institutional environment is obtained from secondary data sources, interviews with key role-players in the value chain, and other primary data obtained by means of questionnaire surveys where individual farmers and buyers are interviewed.

3.4.4 GOVERNANCE STRUCTURES (LEVEL 3)

Transaction Cost Economics is one of the "branches" of New Institutional Economics (Kerrelah and Kirsten, 2002) and can be used to analyse the governance structures at the third level of the NIE framework (Williamson, 1998; Milagrosa, 2007).

3.4.4.1 Transaction Cost Economics

The fundamental argument in Transaction Cost Economics is that economic governance is a prerequisite for using resources in an economic optimal manner, and thus also for enhancing economic efficiency. Within Transaction Cost Economics, institutions are furthermore hypothesised to be transaction cost-minimising arrangements that may evolve, with changes in the nature and source of transaction costs (Kherallah and Kirsten, 2002). A firm is thus expected to choose that governance structure that will minimise the transaction costs associated with the specific transaction under consideration. Important also is that in Transaction Cost Economics the transaction itself is the basic unit of analysis (Williamson, 1998; Milagrosa, 2007; Kerrelah and Kirsten, 2002).

Hai (2003) states that marketing and transaction costs are "regularly mixed up" in the literature and thereby cause confusion. Hai (2003) cites North and Wallis (1994), who distinguish between transformation costs and transaction costs. Transformation costs refer to those costs that are used to physically transform inputs into outputs, while transaction costs on the other hand refer to the costs associated with the transfer of property rights from one person to another. Thus, by definition, North and Wallis (1994) consider transport, storage and processing costs as transformation costs, while costs associated with assembly, distribution, negotiation, payment, distribution of risk, financing, and enforcement are considered to be transaction costs.

Compared to North and Wallis (1994), who distinguish between marketing and transaction costs, other researchers again include in their definitions of transaction costs all the costs involved in trade (e.g. marketing costs), costs of intangibles (e.g. search for exchange partners), contract, monitoring and enforcement (North, 1990 as cited by Matungul *et al.*, 2001; Kherallah and Kirsten, 2002; and Herrera (2005). Although the definition that Kherallah and Kirsten (2002) attach to transaction cost differs somewhat from that of North and Wallis (1994), they too conclude that transaction cost is primarily concerned with the costs associated with the transfer of property rights. Since there is consensus that transaction costs do exist and relate to the transfer of property rights, Williamson (1985) argues that it is also important to understand what factors cause transaction costs.

Factors causing transaction costs

According to Williamson (1985), there are in general three main causes of transaction costs. Two of those causes relate directly to the behaviour of the human agents who participate in the transaction, while the third relates to the attributes of the transaction under consideration. At this stage it is important to realise that transaction costs may result from adverse behaviour of either of the two transacting parties. As the first behavioural cause of transaction costs, Williamson (1985) argues that, although the intention of any agent who participates in a transaction is to behave rationally, the rationality of his/her behaviour is limited since participants in the transaction are not able to foresee all the possible things that may occur or affect the transaction. Thus, they can only act rationally based on the information that is available to them and within the limits of what they can foresee. Williamson (1998) refers to this limited rational behaviour as bounded rationality.

The second cause of transaction costs that relates to human behaviour is the fact that mankind tends to behave in an opportunistic manner (Williamson, 1985). In this regard, Williamson (1985) refers to opportunism as an agent's "self-interest seeking behaviour with guile". More specifically, opportunistic behaviour has to do with deliberately making available incomplete or distorted information in calculated efforts to purposefully mislead, distort, and disguise contractual specifications (Herrera, 2005). Such actions aim to increase own benefits from the transaction albeit at the expense of the transacting partner. In this regard, asymmetric information is a major cause for opportunistic behaviour and thus also transaction cost. Again, opportunistic behaviour may stem from either party who deliberately deceives and confounds the other party in the transaction. Bounded rationality and opportunism as discussed above are considered to be the two behavioural assumptions of Transaction Cost Economics (Milagrosa, 2007).

As for the last cause of transaction costs, there are three attributes of transactions that determine transaction costs; asset specificity, transaction frequency, and transaction uncertainty

(Hai, 2003). Asset specificity relates to the ability of the specific asset to be transferred to alternative uses (Williamson, 1996) or the opportunity costs that assets have for alternative use. Assets that are considered to be highly specific are those assets with comparatively low value elsewhere which consequently give the owner of the asset strong interest to continue with the transaction because of the high quasi-rents they receive (Hai, 2003). Higher levels of asset specificity, furthermore, give rise to a condition of bilateral dependence between the two transacting partners (Williamson, 1998).

Asset specificity itself, again, can take a variety of forms. Those forms include, amongst others, physical asset specificity, human asset specificity, site specificity, dedicated assets, brand name capital, and temporal specificity (Williamson, 1998). Physical asset specificity in this regard refers to the requirement of specialised physical assets to fulfil the transaction, while human asset specificity refers to the requirement of specialised human skills to perform the job. Increased requirement of specialised assets or specialised skilled labour implies higher physical asset specificity and human asset specificity respectively. Whenever an asset needs a special location relative to the other factors that are necessary to fulfil the transaction, it is said to be site specific. Dedicated assets again refer to assets that have been invested in a certain manner when they also could have been used elsewhere, while brand name capital refers to the use of a specific name or logo for the firm to be distinguished from others. The last form of asset specificity is especially important in the context of agricultural production. Temporal specificity refers to the situation where the value of the product is constrained by time. The importance of temporal specificity for agricultural production centres around biological conditions that cause seasonality in production and the perishable nature of agricultural products. Thus, while timing of the production of an agricultural product is important, timing is just as important when selling the agricultural product. Selling activities must be timed in order to capture the highest possible profits for the product that is marketed (Milagrosa, 2007).

As the second attribute of a transaction that causes transaction costs, transaction frequency refers to the number of times a transaction takes place. The more frequently transactions occur, the more justifiable it is to employ an expensive governance structure that is needed to reduce transaction costs (Hai, 2003). More frequent transactions furthermore require specific contract agreements in order to, amongst others, reduce risk, avoid opportunistic behaviour and prevent hold-ups (Milagrosa, 2007).

The last attribute of a transaction that causes transaction costs is related to the uncertainty associated with the specific transaction under consideration. Again, different kinds of transaction uncertainty exist. Firstly, Hai (2003) distinguishes between primary and secondary uncertainty, while Milagrosa (2007) cites Verhaegen and Van Huylenbroeck (2002:23) and Rindfleisch and Heide (1997:31), who distinguish between exogenous and endogenous uncertainty. According to Hai (2003), primary uncertainty arises from “random acts of nature or unpredictable changes

in consumers' preferences". Related to the definition of primary uncertainty, Milagrosa (2007) refers to exogenous uncertainty as uncertainty in either the institutional environment (changes in market policy, practices and regulations), or the market environment (variation in demand, changes in the price of complementary of substitute products). Thus, from the definition of exogenous uncertainty, there seems to be a link between exogenous uncertainty and primary uncertainty as referred to by Hai (2003). With regard to secondary uncertainty, Hai (2003) argues that it is a result of the lack of communication or the fact that it is impossible to control whether tasks are carried out strictly as specified in the contract. Again, endogenous uncertainty as referred to by Milagrosa (2007) relates to this definition of secondary uncertainty. According to Milagrosa (2007), endogenous uncertainty refers to behavioural uncertainty and comes in the form of actions of key market players that affect how transactions are conducted (Milagrosa, 2007). Such actions may refer to a lack of communication between transacting parties as a source of secondary uncertainty as defined by Hai (2003).

3.4.4.2 Measuring the attributes of the transaction that cause transaction cost

Quantifying the level of asset specificity

When assessing the attributes of transactions Shelanski and Klein (1995) argue that, of all of the explanatory variables that cause transaction costs, the one that is the most difficult to measure is asset specificity. Due to the difficulty in measuring asset specificity, researchers mostly use proxies for the alternative types of asset specificity. Shelanski and Klein (1995) provide a brief discussion of the different proxies that have been used in the literature, which include, amongst others, a qualitatively coded component "complexity" (Masten, 1984) or expenditures on research and development to serve as a proxy for the degree of physical asset specificity; the need for worker-specific knowledge as a proxy for human asset specificity (Monteverde and Teece, 1982); and the physical proximity of the firm under consideration as a proxy for site specificity (Joskow, 1985, 1987, 1988, 1990; and Spiller, 1985). Information on all of the above proxies is obtained from survey data using Likert-type questions where the respondent has to rank a specific statement on a scale from one to seven. A limitation to such a method to elicit data is that the answer is "based on the respondent's stated beliefs rather than on their beliefs or valuations as revealed through choice" (Shelanski and Klein, 1995). A further criticism of this approach is that since such measurements are based on ordinal rankings, this makes it impossible to compare them between one industry to another (Shelanski and Klein, 1995).

Milagrosa (2007) uses directly observable attributes to describe and estimate transaction costs. Directly observable specific asset attributes include physical and human asset specificity, site specificity, and temporal specificity. Again, due to the difficulty in measuring asset specificity the specific type of asset specificity is elicited using proxies. If the respondent, for example, owns a vehicle that is specific for the transaction under consideration it is an indication that the

transaction exhibits a higher level of physical asset specificity. As a proxy for human asset specificity the number of years of experience in the specific activity can be used. Again, the higher the number of years of experience, the higher the level of human asset specificity is considered to be involved. Site specificity is also an observable characteristic and is very relevant when referring to agricultural production. Farmers invest, for example, in vegetable production on their farms, and in their particular municipalities, which indicates that there should be some level of site specificity. However, if farmers also reside on the farms where they produce the vegetables, the level of site specificity is lower than initially expected. With regard to temporal asset specificity, Milagrosa (2007) argues that the presence of physical assets that may have an effect on the timing of delivery and the value of the product that is sold may also be an indication of temporal asset specificity. The perishable nature of vegetables emphasises the importance of temporal asset specificity in the case of vegetable production and trade.

Quantifying transaction frequency

Transaction frequency refers to the number of transactions between the producer and a specific buyer. In order to quantify the transaction frequency, farmers are asked to indicate the number of times they have sold produce to the specific buyer during the past season.

Quantifying transaction uncertainty

The third attribute of the transaction relates to uncertainty associated with the transaction under consideration. Uncertainty can be divided into exogenous and endogenous uncertainty. Since exogenous uncertainty refers to uncertainty with regard to changes in demand for the underlying product and consumer preferences, exogenous uncertainty is observable without having to ask respondents about its level.

Endogenous uncertainty centres around uncertainty with regard to the possibility of receiving delayed payment and the fact that trading partners may withhold important transaction specific information from each other. The level of endogenous uncertainty needs to be elicited directly from the respondents. Respondents are asked whether they received delayed payments from their trading partners (Yes/No). The presence of delayed payments represents higher levels of endogenous uncertainty and therefore also higher levels of transaction costs. Similarly, respondents are asked whether or not they believe their trading partners are withholding important information from them (Yes/No). Withholding important information relates to opportunistic behaviour, which occurs when one of the transacting parties deliberately withholds important information in order to increase his/her own benefit from the transaction. Again, the perception that the other party withholds important information is associated with higher levels of endogenous uncertainty and thus also higher levels of transaction costs. Similar to exogenous uncertainty, the level of endogenous uncertainty is also influenced by the type of governance structure employed.

3.4.4.3 Matching the transaction with an appropriate governance structure

Mahoney (1992) developed a framework to guide the choice of vertical coordination strategy (governance structure) based on the attributes of the transaction. Based on this framework of Mahoney's (1992) there are three conditions that have to be considered when deciding on a coordination strategy, namely, separability, asset specificity, and task programmability. Separability refers to the ability to determine and measure the value of the contribution of each of the parties, and hence the reward for each participant in the transaction. Asset specificity refers to the level to which the assets are specific to the transaction under consideration. Lastly, task programmability refers to the degree of uncertainty within the transaction. Based on these three conditions, the framework of Mahoney (1992) recommends a certain vertical coordination strategy to best fit the attributes of the transaction under consideration. Table 3.1 shows the recommended strategies for different transaction attributes.

Table 3. 1: Predicting the organisational form of vertical control.

	Low Task Programmability		High Task Programmability	
	Low Specificity	High Specificity	Low Specificity	High Specificity
Low non-separability	1: spot market	2:long-term contract	5: spot market	6: joint venture
High non-separability	3: relational contract	4: clan (hierarchy)	7: inside contract	8: hierarchy

Source Mahoney (1992)

Definitions:

Low task programmability:	Observed input (effort) is a poor measure for making rewards.
High non-separability:	Observing output is a poor measure for making rewards.
High specificity:	Human, physical and/or site firm-specific investments are high.
Spot market:	The price system works smoothly.
Long-term contract:	Obligations of principles and agents are specified and enforced by third parties (courts).
Relational contract:	Obligations of principles and agents are specified and self-enforced.
Inside contract:	A hybrid arrangement between contract and hierarchy that is best described as a "manager as monitor" setup.
Joint ventures:	An equity agreement whereby a separate entity is created.
Hierarchy:	A superior-subordinate relationship; financial ownership.
Clan:	Organisation that is based on a vital sense of human solidarity.

Table 3.1 shows that a transaction where the output of individuals can easily be measured (low non-separability), and if the transaction is characterised by low levels of asset specificity (cases one and five in Table 3.1), there is no need for any form of vertical coordination, regardless of the levels of uncertainty associated with the transaction. On the other hand, when the output of

the individual parties cannot be easily measured, and the transaction is characterised by high levels of asset specificity (cases four and eight), complete vertical integration (hierarchy) is required, regardless of the degree of uncertainty associated with the transaction. A transaction where the outputs of the individual parties can be measured and if the transaction is characterised by high levels of asset specificity, would require a long-term contract in the presence of low levels of uncertainty (case 2), while a joint venture may be needed in the presence of high levels of uncertainty (case 6). Lastly, a transaction where the output of individual parties cannot be measured and the levels of asset specificity are low, would require a relational contract if the transaction face low levels of uncertainty (case three), while an inside contract would be required in the presence of high levels of uncertainty.

After matching the attributes of the transaction with the recommended vertical coordination strategy using the Mahoney framework, another decision-making framework is used to determine whether or not there is a need to change the current vertical coordination strategy. The application of the second decision-making framework allows for the validation of the recommendations from the application of the framework by Mahoney (1992). The procedures to determine whether or not there is a need for more vertical coordination are discussed next.

3.4.4.4 Is there a need for more vertical coordination?

In the framework of Peterson *et al.* (2001), a decision maker will arrive at a specific vertical coordination strategy by answering five interrelated questions. The framework will only result in a changed coordination strategy if all of the respective questions are answered with a “yes” (Jordaan and Kirsten, 2008). A diagrammatic representation of the decision-making framework for changing vertical coordination strategies is shown in Figure 3.5.

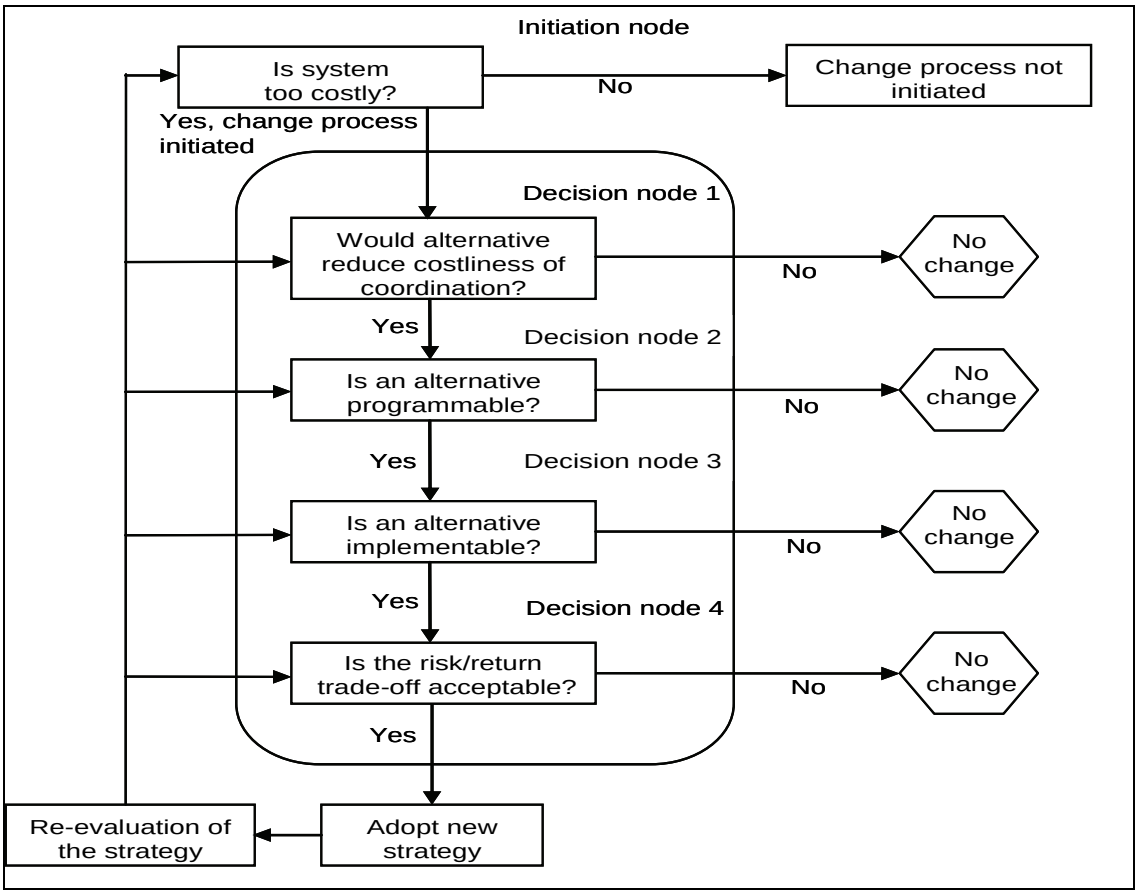

Figure 3. 5: A decision-making framework for changing vertical coordination strategies.

Source: Peterson *et al.* (2001)

Question 1 – Is the current marketing system too costly?

According to Peterson *et al.* (2001), there are two main reasons for why a current marketing strategy may be too costly. Firstly, it may allow costly coordination errors by exposing the firm to the opportunistic behaviour of trading partners or it may result in chronic over or under production compared to demand. The second reason relates to a method of coordination control that creates more operating cost than the cost reduction in coordination errors that it is designed to control. If the current strategy is too costly, a process of changing the strategy is initiated, and one may go on to ask the second question.

Question 2 – Would an alternative strategy reduce the "costliness" of the marketing system?

The second question relates to whether or not another strategy would better match the intensity (and cost) of coordination control with the costliness of coordination errors. The match is judged better or worse on the principle that the more costly the errors the more intense the control needed. Conversely, the less costly the coordination errors the less intense control is needed (Peterson *et al.*, 2001). The costliness of the coordination errors depends very much on the level of asset specificity, and complementarity (Williamson, 1973, 1975, as cited by Peterson *et al.*, 2001; Mahoney, 1992, as cited by Peterson *et al.*, 2001; and Milgrom and Roberts, 1992, as

cited by Peterson *et al.*, 2001). As the level of asset specificity increases, the costliness of coordination errors increases, since the underlying asset value would be affected adversely by such errors. The presence of complementarity (also referred to as non-separability) implies that the output that is obtained from joining the two parties is larger than the sum of the outputs that would have been produced by the individual activities. Again, the costliness of coordination errors increases with an increase in complementarity. Peterson *et al.* (2001) argue that managers need to assess both of these variables relative to the specific transaction under consideration and then select that coordination strategy that matches the intensity of control with the costliness of coordination error.

Question 3 – Is an alternative programmable?

According to Peterson *et al.* (2001), the fact that a potentially better strategy for controlling coordination errors does exist is not a sufficient reason for adopting the alternative. Since the alternative strategy needs to be workable, the manager must determine whether effective, specific management routines do exist. Decision makers need to go beyond their own experience to search for effective coordination strategies used by others in similar settings. The presence of a programmable alternative allows one to move to the fourth question in the decision-making framework, which relates to the implementability of the proposed alternative(s).

Question 4 – Is an alternative implementable?

The fact that an alternative is available (programmable) does not necessarily imply that it can be implemented effectively (Peterson *et al.*, 2001). Peterson *et al.* (2001) further state that the implementability of a strategy is mainly influenced by the availability of capital, the existence of compatible partners, competence of control, and institutional acceptability. In order to be able to implement a new strategy, the decision makers need sufficient capital to finance the change. There needs to be a transacting partner who meets the requirements of the new strategy, and the decision maker himself also needs to exhibit the necessary competence required by the type of control of the underlying transaction. Finally, the change needs to be institutionally acceptable (legal). It needs to comply with formal laws, rules and regulations, and also social, cultural, industrial or group norms. Peterson *et al.* (2001) argue that the decision maker's overall assessment of the above four criteria will determine whether or not the strategy change is implementable.

Before one may finally conclude that more vertical coordination will be more efficient, one has to consider whether or not the risk or return trade-off for changing from contracting is acceptable.

Question 5 – Is the risk/return trade-off acceptable?

In addition to affecting the return, changing the coordination strategy will affect the risk to which transaction partners are exposed. The decision maker needs to balance the potential returns

with the risk that will be incurred with changing the strategy. Only when the decision maker has answered "yes" to all five questions, will the current coordination strategy be changed.

3.4.5 RESOURCE ALLOCATION AND EMPLOYMENT (LEVEL 4)

Resource allocation is concerned with marginal analysis, to analyse productive and allocative efficiency (Milagrosa, 2007). It allows one to determine the maximum output level that can be produced with a given amount of inputs, as well as the minimum cost combination of the different inputs that are used to obtain the optimal output level in the production process. For the purpose of this study, technical efficiency analyses are performed to determine the amount of output the farmers should have been able to produce if they were to operate on the technical efficiency frontier given the current amounts of irrigation water, fertiliser (Nitrogen, Phosphorous and Potassium), and labour applied in the production process. The technical efficiency score provides information with regard to the amount with which the farmer should have been able to increase his output at the current amounts of water, fertiliser and labour that were applied. Cost efficiency analyses are performed to express the minimum possible production cost as a proportion of the actual production cost incurred by the respective farmers given the amounts of water, fertiliser and labour applied in the production process. The cost efficiency score gives an indication of the proportion of the current cost that should have been sufficient to produce the existing amount of output. Both types of efficiency analyses thus give an indication of the prospects for the farmers to increase their performance (in terms of yields and profits) by allocating their production inputs efficiently.

The methodology to investigate the level of efficiency is discussed next, followed by the methodology to investigate the factors that influence the efficiency of the group of emerging farmers under consideration. The last section covers the procedures for modelling the potential impact of interventions in the chain that aim to contribute to providing emerging farmers with an enabling environment to allow them to successfully participate in commercial agri-food chains.

3.4.5.1 Efficiency analysis

The level concerned with resource allocation is assessed by means of efficiency analysis. Data envelopment analysis (DEA) is a commonly used tool for evaluation of technical efficiencies and inefficiencies in various fields of research. It achieves this by analysing the performance of each decision-making unit (DMU). DMUs consume various amounts of each specified input in order to produce various amounts of each specified output. In general, the DEA identifies and estimates inefficiencies (or efficiencies) of the performance of those DMUs (Sexton and Lewis, 2003). Cooper, Seiford, and Tone (2006) argue that the DEA is a good measure of performance of different kinds of items employed in different kinds of activities in many unrelated environments. It is a non-parametric technique that does not require any assumptions with

regard to the functional form for the technology and the distribution of inefficiency conditions. DEA is based on a linear programming algorithm and is designed to identify appropriate weights for each variable (Giannoccaro, *et al*., 2007). It identifies a reference level (frontier) that may serve as a benchmark to which continuous improvement can be compared. DEA estimates relative efficiency scores by computing an efficiency score (either technical or allocative) for each DMU, relative to the most efficient DMUs in the group, that has a score of 1 and lies on the efficiency frontier (D'Haese *et al*., 2001). The performance of a decision-making unit (DMU) is calculated relative to all the other DMUs in the sample. All DMUs will thus be positioned either on (if they are considered to be technically efficient) or below the efficiency frontier (if they are considered to be inefficient) (Haji, 2006).

Advantages of using the DEA approach to quantify technical efficiency levels are that DEA can handle multiple inputs and outputs that have different units of measurement, that it gives attention to best performing DMUs, and that it has the ability to provide prescriptive guidance to non-performing DMUs (Popović and Martić, 2005). Non-parametric techniques, such as DEA, are practical and appropriate since prior assumptions regarding the model are not important, and emphasis is placed on the efficiency of the production process (Giannoccaro, *et al*., 2007). Another major advantage of the DEA procedure for the purpose of this study is that it also allows for the identification of peers for individual respondents. The ability to identify peers enables this study to contribute to encouraging farmer to farmer skills transfer as recommended in NDP (2011) to create a new generation farmers that will be able to expand agriculture in order to contribute to meeting the NPC's vision for 2030.

Recently, the initial DEA model was extended into a two-stage DEA model (Lewis, Sexton, and Lock, 2007; Lu, 2006; and Sexton and Lewis, 2003), where each DMU is further separated into two sub-DMUs, as shown in Figure 3.6. From Figure 3.6 can be seen that the sub-DMU in Stage 1 uses inputs to generate intermediate products, which then serve as inputs in the second stage to produce another form of output. In this sense the input may, for example, be water that is used to produce the intermediate product, vegetables. The vegetables that are produced as output in Stage 1 then proceed to be inputs in the second stage where sub-DMU2 again tries to convert the vegetables (input) into the maximum possible amount of revenue (output). Thus, sub-DMU1 can represent the production activity within a firm while sub-DMU2 represents the marketing activity within a firm. The purpose of the two-stage DEA model, as a matter of fact, is to estimate the relative efficiencies of each DMU and each of its sub-DMUs in order to identify locations of inefficiencies (Lu, 2003). Such information may then be used to improve the efficiency in the location that has been identified as inefficient. Thus, ultimately the overall efficiency of the whole firm, including both sub-DMUs may be improved. It is noted that the distinction between the production and marketing sub-DMUs relate to the idea of Porter (1985) to distinguish between the strategic activities within a firm in order to find potential locations to improve competitiveness of the firm.

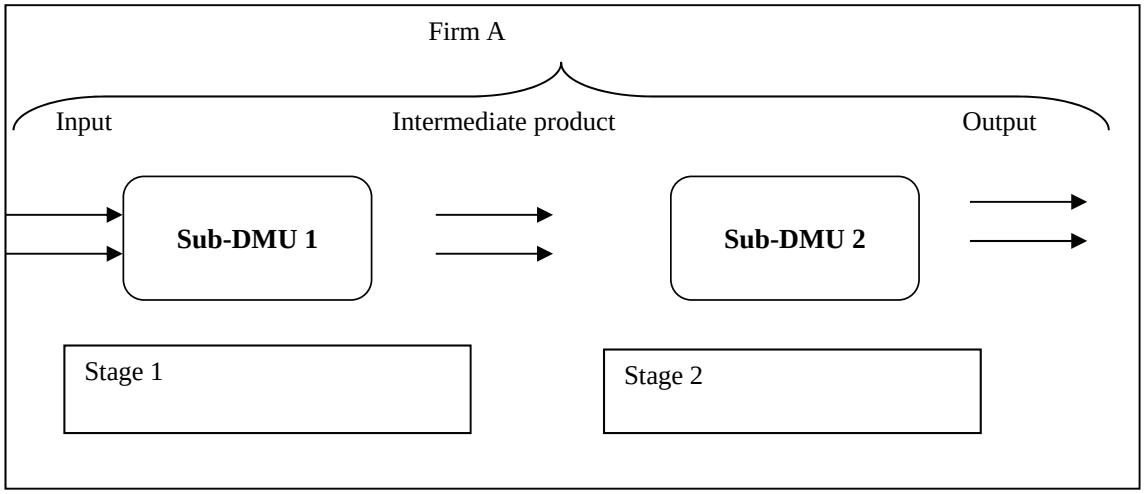

Figure 3. 6: A two-stage DEA Model.

Source: Adapted from Sexton and Lewis (2003)

The two-stage DEA as proposed by Lu (2003) is represented by the following:

Stage I

$$Min\ \theta_{j0}$$

$$subject\ to$$

$$\sum_{j=1}^{J} \lambda_j x_{ij} \leq x_{ij0}\theta_{j0}; \qquad i = 1.....I$$

$$-\sum_{j=1}^{J} \lambda_j y_{pj} \geq y_{pj0}; \qquad p = 1.....P$$

$$\sum_{j=1}^{J} \lambda_j = 1$$

$$\lambda_j \geq 0; \qquad j = 1.....J$$

Thus, $j = 1,....., J$ indicates the group of DMUs and j_0 represents the current DMU. Where x_{ij} (input vector) is the level of input i consumed by DMU j, y_{pj} (output vector) is the level of the intermediate output p produced by DMU j and λ_j indicates non-negative weights or intensity variable defining frontier points. And for stage 2 sub-DMU at DMU j, an output orientation and variables returns to scale are assumed and we solve:

Stage 2

$$Max\ p_z q^*_{zj0}$$

$$subject\ to$$

$$\sum_{j=1}^{J} y_{pj0} \geq \lambda_j y_{pj}; \qquad p = 1.....P$$

$$\sum_{j=1}^{J} \lambda_j q_{zj} \geq q^*_{zj0}; \qquad z = 1.....Z$$

$$\sum_{j=1}^{J} \lambda_j = 1$$

$$\lambda_j \geq 0 \qquad j = 1.....J$$

Where all notation used is as previously defined, except for q_{zj} which represents the final quantity of output z produced by DMU j, and q^*_{zj} is the revenue-maximisation vector of output quantities (which is calculated by the DEA programme) of the *j*-th farm given the output prices p_z. Since output prices p_z are known, Coelli, Rahman, and Thirtle. (2002) specify that total revenue efficiency (RE) of the *j*-th farm is calculated as

$$RE = \frac{p_z q_z}{p_z q^*_z}$$

Therefore, RE is the ratio of observed revenue to maximum potential revenue. The performance of each DMU is approximated relative to all other DMUs in the sample, with one limitation that all DMUs be positioned on or below the production efficient frontier (Haji, 2006). Once the efficiency scores of the different decision makers have been quantified, the next step is to investigate the factors that influence the level of efficiency of the farmers in order to identify factors that may contribute to improve the level of efficiency with which farmers use their inputs. The procedures to investigate the factors that influence the efficiency of the farmers are discussed next.

3.4.5.2 Investigating factors affecting the levels of efficiency of resource use

The Tobit regression model specification is used to investigate the factors that influence the levels of efficiency of the farmers, since the efficiency scores of the farmers are censored (Lu, 2003). Haji (2006) argues that estimation of inefficiency variables with an OLS regression would result in a biased and inconsistent parameter estimate, since OLS regression assumes normal and homoscedastic distribution of the disturbance and the dependent variable. Speelman *et al.* (2007) propose that since the efficiency parameters range between [0; 1], they are regarded as

censored variables and thus a Tobit model was fit and appropriate in the study. The Tobit was used to evaluate inefficiencies in both stages of the analysis. Speelman *et al.* (2007), Lu (2006) and Haji (2006) specify the Tobit as:

$$\theta^{k*} = \beta_0 + \beta_1 z_1 + \beta_2 z_2 + \ldots\ldots \beta_d z_d + e$$
$$= Z\beta + e \qquad (4)$$

Subject to

$$\theta^k = \theta^{k*} \text{ if } 0 < \theta^{k*} < 1$$
$$= 0 \text{ if } \theta^{k*} < 0$$
$$= 1 \text{ if } \theta^{k*} > 1$$

Where θ^k is the DEA efficiency index (technical efficiency score) and the score represents the dependent variable, with β being the parameters of interest and Z a vector of independent variables related to attributes of the sampled farmers used in the analysis (Speelman *et al*., 2007).

Principle component regression (PCR) is used to investigate the factors that contribute to the levels of technical efficiency with which producers use their production inputs. While the actual idea behind PCR is to correct for multi-collinearity among explanatory variables (Ranjit, 2006), PCR also contributes to reducing the number of explanatory variables by grouping related variables into principle components. Since emerging farmers are known not to keep sound records, sample sizes for the purpose of regression analyses when working with emerging farmers are often small. PCR thus contributes to increasing the degrees of freedom for the regression analyses when working with small samples of emerging farmers. Given the nature of PCR, the procedure is also correct for any form of multi-collinearity (Ranjit, 2006) that may exist, as is often the case with primary data obtained from questionnaire surveys. Another major advantage of the approach of PCR followed in this study is that it allows for the identification of the influence of individual variables within the respective principle components, rather than only allowing for the interpretation of the influence of the whole principle component itself.

In essence, the procedure to perform PCR (due to the complexity of the procedures, a more complete version of the procedures to perform PCR is given in Appendix A) starts with the standardisation of all of the explanatory variables to allow the calculation of uncorrelated principle component scores (Magingxa, 2006). The standardised explanatory variables are included in a principle component analysis to identify the number of principle components (or groups of explanatory variables) that can be extracted from the list of explanatory variables.

Only principle components with an eigen-value greater than one are considered (Fekedulegn *et al.*, 2002). The extracted principle components represent all of the explanatory variables that are grouped under each principle component. Instead of using the individual explanatory variables in the regression analyses, the principle components are then used as the explanatory variables. The coefficients of individual explanatory variables within the respective principle components can then be calculated manually from the estimated coefficients of the principle components (Magingxa, 2006).

3.4.6 COMPILING VALUE CHAIN MAPS

For the purpose of this study, product flow maps are compiled for each of the value chains under consideration to get a visual understanding of the value chains within which the emerging farmers from the respective case studies are to be integrated. A product flow map shows the way the physical product moves from the farm through all the stages of value adding, to the end consumer. The product flow maps are then extended to include the distribution of value of the physical product as it moves along the channel on its way to the end consumer. The product flow maps are also extended to include the volumes of fresh water that are used at the respective stages of value adding along the chain. Information from the water-use and value chain maps is used finally to calculate the value of the fresh water at each stage along the value chain.

3.4.6.1 Mapping[2] the flow of physical product along the chain

The starting point when conducting a value chain analysis is to describe the system through which the physical product moves to the end consumers (Neves *et al*., 2004). The product flow map shows the different channels that are available to move the physical product from the farmers to the end consumers. The product flow map is compiled from discussions with key role-players within the value chain under consideration, as well as information documented in secondary data sources. The compiled product flow map then is presented to the key role-players in order to get their feedback in terms of the accuracy with which the map represents reality. Only once all role-players agree that the product flow map is an accurate representation of reality, is it extended by including the distribution of value along the chain.

3.4.6.2 Mapping the distribution of value along the chain

Primary data obtained from personal interviews with role-players along the chain is used to extend the product flow map to include the distribution of value at the respective stages of value

[2] The term, “mapping”, indicates that the relevant information is both presented graphically and discussed in detail.

adding as the product moves along the chain. The value of the product at the farm gate is calculated as the gross margin per ton of the product. The gross margin is calculated by subtracting the direct allocatable costs per ton from the total revenue generated per ton of the product sold.

Calculating the value of the product as it moves along the value chain proves to be more of a challenge. Given the reluctance of market actors downstream from the farm gate to provide information on their cost structures, the value of the product at the respective nodes downstream from the farm gate is represented by the value added at each node. The value added in this sense refers to the difference in the price received per ton when selling the product and the price that was paid per ton when buying the product before adding value to it. Value added in this sense thus includes remuneration of employees, operating surplus and taxes to government (Crafford *et al.*, 2004).

3.4.6.3 Mapping the distribution of water use along the chain

The volumes of water that were used as the product moves along the chain to the end consumer are mapped based on primary data obtained from discussions with role-players along the chain. The volumes of water at each stage are expressed in cubic meter per tonne of the product.

In cases where farmers do not measure the amount of irrigation water they apply, irrigation water requirements are estimated using SAPWAT (Van Heerden and Crosby, 2008). The volumes of water use downstream from the farm gate are obtained from discussions with role-players at the respective nodes, and secondary data sources where necessary. It is noted that the volumes of water that are considered for the purpose of mapping water use include only blue water as referred to in the literature on water footprints and virtual water. Blue water includes the fresh surface and ground water, such as water in freshwater lakes, rivers and aquifers (Hoekstra *et al.*, 2009). Green water (precipitation that is stored in the soil or temporarily stays on top of the soil) is only used at farm level to produce the crop. Green water, however, is not considered when determining the volume of water required to produce the crop, since SAPWAT (Van Heerden and Crosby, 2008) take rainfall into account when simulating the irrigation water requirements for the specific crops under consideration.

Information on the distribution of water that was used and the distribution of value as the product moves along the chain is used next to calculate the value of the water that was used to produce the product and move it along the channel to the end consumer.

3.4.7 QUANTIFYING THE VALUE OF WATER AS THE PRODUCT MOVES ALONG THE CHAIN

The value of the water at the respective stages along the value chain is calculated per cubic meter of water used during the value adding processing within the specific node. In order to calculate the value per cubic meter of water, the value added at each node is divided by the volume of water used in each node. The value of the water used to produce the product is thus expressed as the gross margin per cubic meter of water applied to produce one ton of the product. The measure of gross margin per cubic meter of water that was used is closely related to the concept of the residual value of water (Young, 2005). The main difference is that the measure used in this study does not consider the opportunity cost of own resources used in the production process.

At the nodes downstream from the farm gate, the value of the water is expressed as value added per cubic meter of water applied, since gross margins could not be calculated due to the unwillingness of agents to provide information on their cost structures. At each stage, the cumulative value added is also divided by the cumulative volume of water used up to that stage, to get an understanding of the increase in the value of the water as the product moves towards the consumer. The cumulative value of the water at the last stage, when the product reaches the final consumer, is actually the true value of the water allocated to producing the agricultural product in the first place.

In the next section, the focus shifts to the procedures used to analyse the factors that constrain the ability of emerging farmers to participate in commercial agri-food chains.

3.4.8 PROBLEM TREE ANALYSIS TO IDENTIFY CONSTRAINTS

Data for the purpose of the problem tree analysis is obtained from personal interviews with key role-players within the value chains under consideration, and from information obtained by means of the questionnaire survey. The idea behind the problem tree analysis is to identify critical points where the chain faces limitations that constrain the performance of the participants within the chain. A problem tree analysis reveals the causes and effects of such limitations with the aim to identify potential solutions to overcome the limitations (Lundy *et al*., 2007).

A problem tree is compiled by first identifying the main limitation(s) that constrains the performance of the market participants under consideration. Participants are then asked to identify the causes for the specific limitations. This is to get a better understanding of the central problem and its causes. From this, some leverage points can be identified with the potential to overcome the limitations.

After analysing the limitations and identifying some leverage points that may contribute to overcoming them, the next step is to model the potential impact of the recommended action on the performance of the market participants. The next section discusses the procedures required to do this.

3.4.9 MODELLING INTERVENTIONS RECOMMENDED TO OVERCOME STUMBLING BLOCKS

A cash flow optimisation model developed by Grové (2010) is used to model the potential impact of actions that were recommended based on the problem tree analyses. The cash flow optimisation model optimises the net cash flow per hectare of the crop under consideration. Fixed cash expenditures are allocated to the crop, *pro rata*, based on the proportional use of land by each crop.

In order to accurately represent the situations of the farmers within the case studies, some modifications were made to the model of Grové (2010). The first was to include a restriction in the model to prohibit a negative bank balance. Emerging farmers typically do not have access to overdraft facilities on their bank accounts, hence the model has to be restricted not to allow a negative bank balance. Commercial credit providers are also very reluctant to provide emerging farmers with access to credit since the farmers have no security. The farmers do not have the title deeds for their land and hence they cannot use the land as collateral for commercial credit, nor do they have other assets that can be used. Emerging farmers also typically lack proper financial record keeping, which means that they have no evidence that they would be able to repay their loans. Despite the current situation where the farmers do not have access to credit, the model was modified to include the possibility for the farmers to obtain formal credit. The modification was made so as to model the potential impact of transferring the title deeds for the land to the individual farmers and by implication giving them access to credit.

Most of the emerging farmers are expected to operate at increasing returns to scale. By implication, all of the farmers should be able to increase their yields at least proportionally given proportional increase in input levels. Given that emerging farmers often use less than 50% of the recommended levels of nutrients, the model was also adjusted to allow for a proportional increase in the inputs to model the potential improvement in net cash flow if the farmers intensify their production activities.

The last adjustment to the model was to get the model to force producers to produce on the efficiency frontier. The idea is to model the potential impact on cash flow if the farmer used the inputs in a technically efficient manner instead of at the current level of efficiency. Modelling the potential impact of improving the level of technical efficiency may give an indication of the potential return to more training and assistance for farmers with regard to using their inputs in an efficient manner.

The modelling of the potential benefits associated with implementing recommended actions concludes the discussion of the procedures used in this study. In the next chapters, the conceptual framework is applied to three different case studies. These include raisin producers from Eksteenskuil in the Northern Cape Province, vegetable producers from Zanyokwe Irrigation Scheme in the Eastern Cape Province, and maize vegetable producers from Thabina Irrigation Scheme in the Limpopo Province.

CHAPTER 4

CASE STUDY – EKSTEENSKUIL RAISIN PRODUCERS

4.1 INTRODUCTION

Chapter 4 applies the conceptual framework presented in Chapter 3 to the case of emerging raisin producers from Eksteenskuil. First, data collection is discussed, followed by the SCP analysis of Eksteenskuil raisin producers describing the current physical and market environment within which they have to operate, the way they operate, and their level of success. Following this is the New Institutional Economics (NIE) analysis of the production and marketing of raisins by the farmers from Eksteenskuil. This provides further insight into why the farmers behave and perform the way they currently do. More specifically, the NIE analysis is concerned with the social embeddedness of the farmers from Eksteenskuil, the institutional environment within which they operate, the governance structures that they use to minimise transaction costs, and the levels of efficiency with which they use their resources.

The NIE analysis is followed by an attempt to map the value chain within which the raisin producers from Eksteenskuil are participating. The value chain map is elaborated with the inclusion of the change in value and the volumes of water used as the product moves along the value chain. The critical points in the value chain are also considered to identify stumbling blocks that constrain the performance of the Eksteenskuil farmers, followed by a discussion of potential leverage points to overcome these. The last section of Chapter 4 is concerned with a mathematical modelling of potential benefits from such interventions.

4.2 BACKGROUND TO EKSTEENSKUIL

Eksteenskuil is a community of Coloured farmers who were settled in the area during the 1950s. Initially they cultivated mostly cash crops such as peas, dried beans, lentils, cotton, maize, lucerne, wheat, and on very small scale also vegetables for domestic use. In the 1970s, they started to establish vineyards. As time went by, people moved away from cash crops as this was not economically viable. Currently, most Eksteenskuil farmers produce grapes for raisins (Kok, 2008).

In 1994, the farmers organised themselves as the Eksteenskuil Farmers' Association (EFA). They were introduced to Traidcraft from the United Kingdom (UK) through a non-governmental organisation in the Western Cape. Traidcraft is a fair-trade affiliated buyer of products from developing countries (Traidcraft, 2011). The idea behind fair-trade is to fight poverty by improving production and trading conditions to benefit smallholder farmers, farm workers and disadvantaged employees and artisans (Fair Trade South Africa, 2011). In essence, previously marginalised producers receive fair prices (higher than market price) for their produce to assist them to transform their lives through trade. The community also receives a fair-trade premium that has to be spent according to a list of strict guidelines (Kok, 2008). It is noted that the farmers only get access to the funds through the crops they export via the fair-trade initiative. The farmers thus have to produce crops that meet stringent quality requirements.

In 1995, EFA started selling some of their raisins (on a small scale) to Traidcraft. After an inspection by the Fairtrade Labelling Organisation (FLO) in 2003, EFA received FLO accreditation, which allowed them to formally export raisins via the fair-trade initiative. Since EFA did not have processing facilities, the raisins were first sold to SAD who processed and packed the raisins according to the specifications of the FLO. EFA then bought back some of the raisins and sold them to Traidcraft. In 2006, FLO urged EFA to find ways that would allow them to export their own raisins, in order to maximise the benefit to the community. The management committee of EFA realised that they might need a more appropriate legal entity that would allow them to export their own raisins. After a consultative process, the Eksteenskuil Agricultural Cooperative (EAC) was registered towards the end of 2006. Since 2006, the Eksteenskuil farmers have exported their raisins as EAC via the fair-trade initiative (Kok, 2008).

4.3 DATA COLLECTION

The study is based upon both primary and secondary data. The primary data was obtained from numerous personal interviews with the key role-players in the raisin value chain, as well as two questionnaire surveys where individual farmers were personally interviewed to obtain farm-level data. The procedures used to develop the questionnaires are discussed next, followed by a description of the sampling procedures, and the actual surveys conducted.

4.3.1 DEVELOPMENT OF QUESTIONNAIRE

In developing the questionnaire (Appendix B), a comprehensive literature review was made, and this was followed by a number of field visits to the research site to start developing a relationship with the key role-players in the value chain. It was soon realised that relationships with the role-players, especially the emerging farmers themselves, would be crucial to the success of the project.

The literature most important in the development of the questionnaire was, amongst others, literature on the theories of Structure-conduct-performance (SCP), New Institutional Economics (NIE), efficiency analyses, and literature on raisin production and marketing. The literature on SCP was useful in compiling questions to capture information on the physical environment (production and marketing) in which the raisin producers operate. It also shaped questions about the current behaviour of the role-players in the value chain. Literature on the theory of NIE allowed the authors to capture information on the cultural aspects (i.e. norms and traditions), social capital, and the formal and informal rules and regulations that are hypothesised to influence the behaviour of the actors in the market. It also contributed to capturing information on the characteristics of the transactions between the farmers and their buyers to allow for a transaction cost analysis of the transactions to determine whether or not the current governance structure is minimising the transaction costs faced by farmers. Efficiency theory provided insight into the type of questions to ask to obtain information that would allow for quantifying the levels of efficiency with which raisin producers use their inputs as a measure of their current performance. The literature on efficiency analysis also contributed to the inclusion of questions relating to the use of resources, which might provide suggestions for improving performance through more efficient use of resources.

The literature review also formed the basis for the discussions with the key role-players in the chain. Such role-players included some of the prosperous farmers (emerging and commercial farmers) in the study area, the chair person and the board of the Eksteenskuil Agricultural Cooperative (EAC), and representatives from some of the processing companies who buy raisins from the farmers. With the theoretical framework in mind, discussions with the key role-players aimed at gaining insight into the functioning of the value chain, with a special interest in the physical and institutional environments within which the actors operate. The discussions also aimed at gaining information with regard to the technical aspects of raisin production that are believed to contribute to the production of high volumes of good quality raisins. The discussions with the role-players also allowed the authors to adapt the theoretically founded questions to fit the case of raisin production and marketing.

The information obtained from the literature review and personal discussions was used to compile the preliminary questionnaire. At that stage the questionnaire was already in the proposed format of the final questionnaire to ensure that the coding would allow for testing the underlying hypotheses. The preliminary questionnaire was discussed comprehensively on a one-on-one basis with the key role players to get their feedback on the questionnaire and to make sure that all important aspects were covered. After their concerns and recommendations were considered, the preliminary questionnaire was again discussed with them. Once the key role-players agreed that the questionnaire covers all the important aspects, the next step was to determine whether or not the questionnaire was understood by farmers, and that questions would be interpreted correctly. A pilot survey was conducted where four commercial and four

emerging raisin producers were interviewed. The interviews were conducted similar to the way the actual survey would be conducted, but respondents were asked to be super-critical of the questions to ensure that all questions were clear. Once all the suggestions and concerns of the respondents within the pilot survey were handled, the questionnaire was considered to be acceptable and finally ready for the actual survey.

The questionnaire was also modified into a second questionnaire for a second survey at a later stage to also include questions to measure the levels of economic literacy of the Eksteenskuil raisin producers. The questions were developed to explore the effect farmers' economic literacy has on the efficiency with which they allocate inputs when taking input prices into consideration. The questionnaires of Chizmar & Halinski (1981), Soper & Brenneke (1981) and Wood & Doyle (2002) were used as a guideline in the construction of the questions. To measure the farmers' economic literacy, a series of questions was developed on economic concepts faced in their farming practices. Economic concepts mentioned in the literature review were used as a base to compile the economic literacy questions. The economic concepts included comprehension of the market and exchange. Analytical evaluation and simple applied economic questions relating to scarcity, economic systems, and economic incentives were also included in the questionnaire. Considering that they export their produce and face a number of economic matters on a daily basis, questions were developed to measure respondents' ability to make important economic decisions. Understanding the exchange rate as well as current affairs surrounding the exchange rate is one of the economic matters raisin producers face. Another matter that became clear through previous interviews was that for Eksteenskuil's farmers money is a scarce resource. Money is needed to buy timely inputs such as fertiliser, chemicals and labour. Money is also needed to invest in new grapevines before they become unproductive. Farmers should be able to make proper decisions on the allocation of their scarce resources. Eksteenskuil farmers need to be knowledgeable about credit, interest rates, least cost inputs that provide high quality, prices for raisins from different processors, the exchange rate as well as the fairtraide premium that can be expected.

4.3.2 SAMPLE DESIGN

The EAC consists of approximately 60 members who produce raisins. Given that smallholder farmers are known not to keep sound records, and since there are only 60 farmers in the study area, it was decided to include the whole population of farmers in this study. The idea was to ensure as many useable questionnaires as possible to allow for statistical analysis.

Since the study also wants to compare the emerging farmers to commercial farmers in the area, some of the commercial farmers from the irrigation boards that surround Eksteenskuil were also included in the sample. The surrounding irrigation boards (IB) that were considered include Keimoes IB, Neilersdrift IB, and Kanoneiland IB. Since Keimoes IB and Neilersdrift IB are the

closest to Eksteenskuil, all of the farmers from those two irrigation boards were contacted to make appointments to be interviewed. Kanoneiland is somewhat farther from Eksteenskuil and farmers from the Kanoneiland IB were randomly selected to make sure that the sample of commercial farmers is similar to that of the Eksteenskuil farmers who completed usable questionnaires. It is noted that the commercial farmers were selected only after the survey was conducted at Eksteenskuil to make sure that a sufficient number of commercial farmers were interviewed to allow for a comparison between the emerging farmers and commercial farmers surrounding them.

For the purpose of the second survey, all 60 farmers from Eksteenskuil again were included in the sample, while no commercial raisin producers were considered.

4.3.3 THE SURVEY

Given that the native language spoken by the farmers from Eksteenskuil is Afrikaans, there were no linguistic problems associated with the interviews. Four research assistants and two senior researchers from the Department of Agricultural Economics of the University of the Free State were contracted as interviewers to assist with the survey. A training session was held for the interviewers to ensure that they all had a common understanding of the meanings of the questions in the questionnaire and of the purpose of the survey.

The chairperson of the board of directors of EAC suggested that it would make more sense logistically to conduct the interviews at central points on the different groups of islands. Given that he has had experience with a number of projects that conducted surveys among the farmers, it was decided to follow his recommendation. Farmers from the North and Middle groups of islands were interviewed at the offices of EAC, while the farmers from the South group of islands were interviewed at a community hall on the South Island. Although the farmers were interviewed at a central location, farmers still were interviewed separately. Care was taken to keep a sufficient distance between interview stands to ensure that farmers' information remained confidential and could not be overheard by other interviewees.

The initial survey was conducted from the 17th to 23rd June 2009. A total of 42 respondents from Eksteenskuil completed questionnaires and 31 of these questionnaires were deemed usable for further analysis. As a token of appreciation to the farmers, it was decided to have a braai for the respondents. It is worth mention that the informal discussions around the fire also brought various other "soft" issues that influence the behaviour of the farmers to the attention of the research team.

Given that 31 usable questionnaires were completed by Eksteenskuil farmers, 30 commercial farmers were also interviewed. The commercial farmers were personally interviewed at their

homes. The sub-sample of commercial farmers, however, was kept separate from the Eksteenskuil farmers for most of the analyses. The commercial farmers were only considered when comparing them to the Eksteenskuil farmers.

The second survey was conducted from 20th to 22nd June 2011. The same approach was followed as with the first survey. Interviewers were trained comprehensively to ensure that the questions are understood correctly. Interviews were conducted at central locations and a braai was held for the farmers as a token of appreciation.

4.3.4 DISCUSSION

The contribution of a comprehensive literature review before commencing with data gathering cannot be overemphasised. It allows the correct type of questions to be asked and in such a manner that the answers contribute to solving the research problem. Similarly, the importance of getting into the field to get to know the farmers and their environment cannot be overemphasised. Especially when working with emerging farmers, one needs to develop a relationship with the farmers to get access to the "softer" issues that really trouble them. One needs to keep in mind that the political history of South Africa created a racial divide which has to be overcome to create sufficient levels of trust to gain access to the "soft" information.

The following sections present and discuss the results from the analyses based on the data that was gathered with the questionnaire survey and other interviews.

4.4 STRUCTURE-CONDUCT-PERFORMANCE ANALYSIS OF EKSTEENSKUIL RAISIN PRODUCERS

The aim of the SCP analysis is to get a comprehensive understanding of the physical environment within which the emerging farmers at Eksteenskuil produce and market their raisins, and the way they operate within the environment. The importance of the environment and the behaviour of the farmers is centred around its role in influencing the performance of the farmers under consideration. The structure component is discussed next, followed by the conduct and performance components of the SCP analysis. The bulk of the information that was used for the purpose of the SCP analysis was obtained from discussions with key role-players in the raisin value chain.

4.4.1 STRUCTURE

The structure component is concerned with the physical environment within which the value chain participants operate. The structure component is divided into farm structure and market structure. The farm structure includes information about the region within which the chain

operates, the distribution of land among farmers, and the land ownership and tenure of the farmers in the study area. The market structure considers the different types of markets and actors in the markets, the different marketing channels that are available, the location of and the infrastructure at the markets, and the road networks that connect the farms with the markets.

4.4.1.1 Farm structure

The region

Eksteenskuil is situated in the Northern Cape Province and is about 50 kilometres west of Upington. Figure 4.1 is a map of the Northern Cape Province to get an idea of the physical location of Eksteenskuil. Keimoes is the nearest town and is about ten kilometres away from Eksteenskuil. The Northern Cape Province is an arid region and experiences little rainfall, averaging less than 300 mm per annum (DEAT, 2009). Keimoes itself generally receives about 84 mm of rain per annum with the highest amount being recorded during the autumn months (SA Explorer, 2008). That part of the Northern Cape is also known to have high temperatures during the summer months with an average midday temperature during January of 33°C.

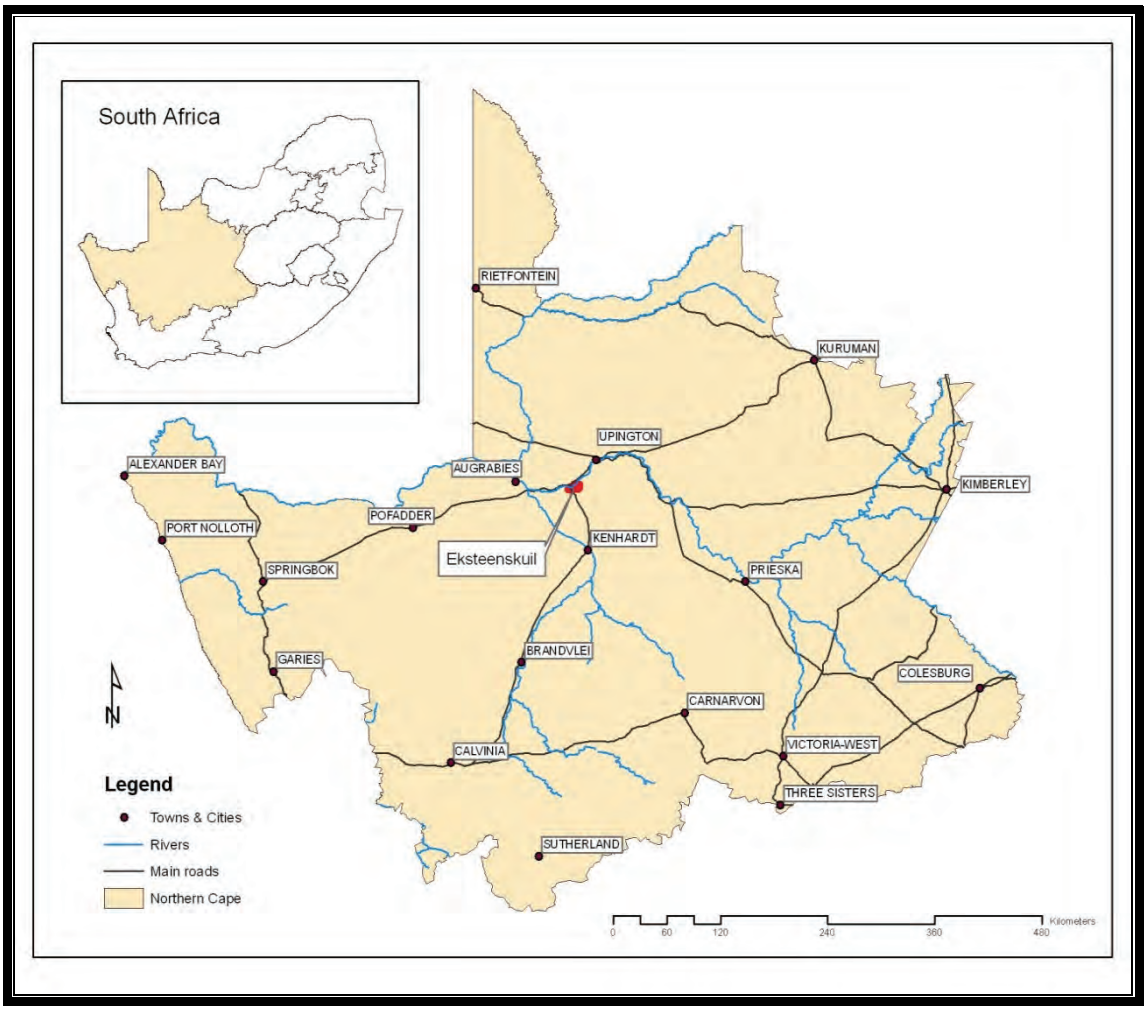

Figure 4. 1: Map of the Northern Cape Province of South Africa.

The close proximity of the area to the Kalahari Desert means that the region experiences a desert-like climate. The Orange River passes through Eksteenskuil and splits the land into 17 small islands where the farmers produce their crops. The 17 islands form three main groups which are called South Island, Middle Island and North Island (Figure 4.2). Each group of islands consists of a number of smaller islands.

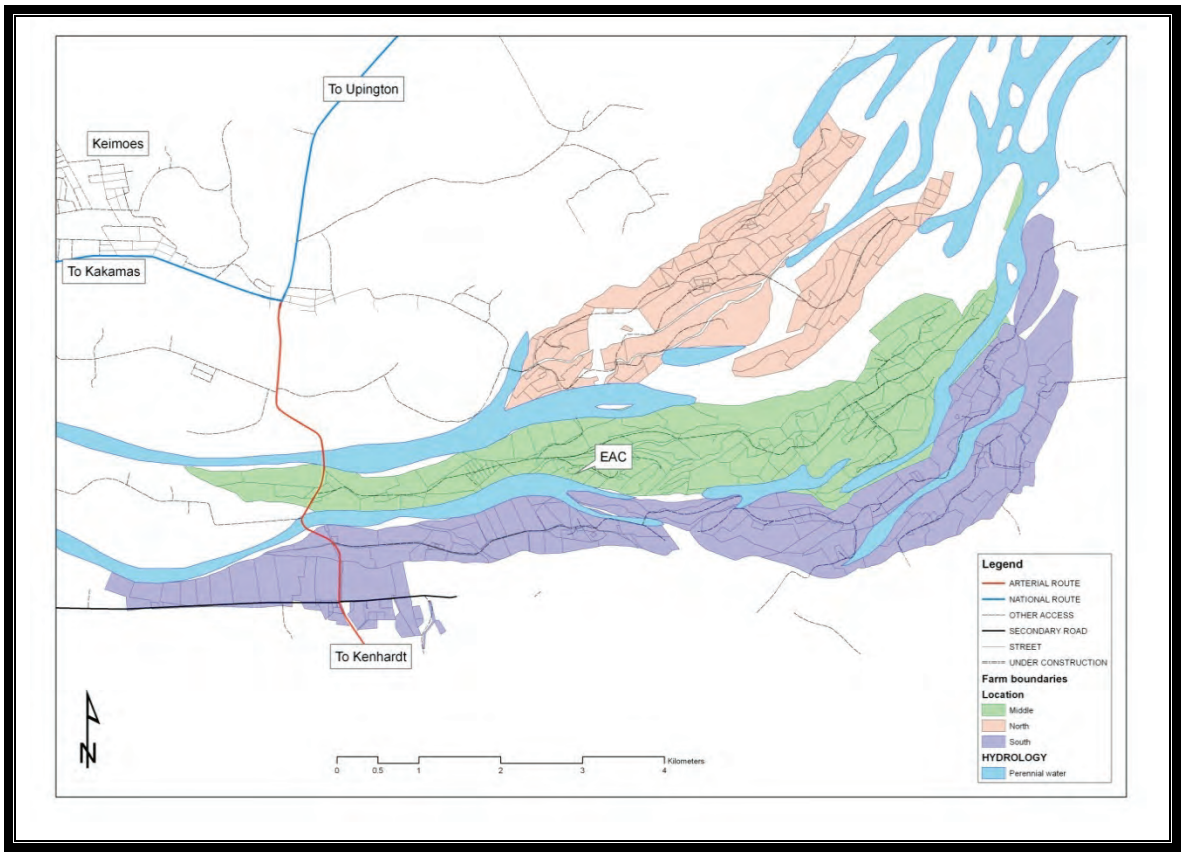

Figure 4. 2: Map of the Eksteenskuil region.

A major problem with regard to the different island groupings is that travelling from South Island to North Island is only possible by travelling around Middle Island, as is evident from Figure 4.2. There is no road that connects all three groups of islands.

Distribution of land

The total land area of Eksteenskuil is about 2000 hectares whereof only about 600 hectares is arable. Eksteenskuil currently consists of approximately 100 farms with the sizes typically ranging from 2 to 5 hectares (Kok, 2008) which suggests that the farmers from Eksteenskuil are also constrained by the small scale of operations as was identified in the literature review. The average size of farms is about 3.8 hectares (Kok, 2008). The farmers live on their farms.

Land ownership and tenure

Similar to other situations concerned with emerging farmers in South Africa, land ownership at Eksteenskuil is a sensitive and complex topic. At this moment only about 40% of the farmers at Eksteenskuil do have the title deeds for their land. The other farmers lease their land from other farmers or government.

Water distribution network

The water distribution network is in a poor condition. The wall of the dam that is used to store water at Eksteenskuil is leaking (Figure 4.3). Eksteenskuil farmers irrigate from canals. The canals are poorly maintained and consequently have a number of breakages and leaks (Figure 4.4). The poor condition of the water infrastructure has a negative impact on the security of water supply to the farmers, and causes substantial wastage of water.

Figure 4. 3: Break in the dam wall at Eksteenskuil.

Figure 4. 4: An example of a broken canal at Eksteenskuil.

4.4.1.2 Market structure

Market types

Due to the nature of raisin production and the typical uses for raisins, they first need to be washed and cleaned to make sure that no foreign objects are mixed with the raisins. The washing, cleaning and packing of the raisins typically are referred to as the primary processing of raisins. The primary processing of raisins require sophisticated technology, especially for removing foreign objects from the raisins. Farmers do not do the primary processing themselves, but rather sell their raisins to processing companies that have the necessary facilities.

Market actors

In addition to the farmers, other actors in the market include the **input suppliers** and the **processing companies** in the region that buy raisins from the Eksteenskuil farmers. Some of the input suppliers where Eksteenskuil raisin producers purchase their inputs include, amongst others, Baard Landboudienste, Bayer, Kaap Agri, UAP, and Viking. Almost all the raisins produced at Eksteenskuil are sold to South African Dried Fruit (SAD) since it is the only avenue that allows the farmers to benefit from the fair-trade initiative. It is important to note, however, that Eksteenskuil farmers have full autonomy to decide to whom they want to sell their produce. Other processing companies in the region to whom farmers can sell their raisins include Carpediem, Fruits du Sud, Kalahari Raisins, Redsun Raisins, and the Raisin Company.

Transport for their raisins from the farm to the processing plant is the responsibility of the farmers. The processing plants, in turn, outsource the transport of the primary processed raisins from their plants to the downstream buyers (secondary processors, wholesalers, retailers, or exporters). The nature of raisins allows them to be **stored** for a considerable period of time. This is generally at the processing plant. The raisins are only processed and packed when the processor receives an order from their buyers.

Only a small proportion of the total raisin production (<20%) is sold to retailers to be sold as raisins. As a matter of fact, only SAD indicated that they sell some of their raisins to retailers to be sold as raisins. Most of the raisins are used as ingredients in the bakery industry. Raisins are used as an ingredient in many products, such as fruit cakes, muesli, energy bars and biscuits. By far the largest proportion of raisins is **exported** by the primary processing companies to international buyers. This is the case with the choice grade raisins produced at Eksteenskuil. Choice grade raisins are exported to the United Kingdom under the fair-trade initiative. Traidcraft is the fair-trade affiliated buyer who imports the Eksteenskuil raisins from SAD.

Marketing channels

The marketing channel refers to the flow of the physical product from the farm to the end consumer. There are four different categories of marketing channels that can be used by raisin producers:

1. Farmer – Local processor – Foreign processor (fair-trade) – Foreign retailer – Foreign consumer
2. Farmer – Local processor – Local retailer – Local consumer
3. Farmer – Local processor – Exporter – Foreign processor – Foreign retailer – Foreign consumer
4. Farmer – Local processor – Secondary processor – Local retailer – Local consumer

From the above it is clear that, regardless of the specific channel to follow, the farmers sell their raisins to a local processing company (i.e. SAD). The ownership of the fruit is transferred to the processing company once the farmer gets paid for the raisins delivered to it. Thus the decision as to which marketing channel to follow does not lie with the farmer.

The category of marketing channel that can be used from the local processor downstream is influenced by the grade of the raisins produced. Raisins that qualify for standard and industrial grades are normally used only as ingredients in the bakery industry and typically will follow marketing channel Category 4. Choice grade raisins can either be exported to be used as ingredients by foreign secondary processors (Category 3), or they can be packed and sold as raisins to local retailers (Category 2). It is important to note that grading only takes place on delivery of the raisins to the processing plant. The grade to be achieved cannot be determined by farmers prior to delivery of the raisins to the processing plant, hence the inability of the farmer to choose which marketing channel to follow.

While standard and industrial grade raisins produced by Eksteenskuil farmers are mixed with those of commercial farmers, the raisins that qualify for those two grades will also follow Category 4. The only difference in the marketing channel for raisins produced by Eksteenskuil farmers and those produced by commercial farmers relate to choice grade raisins. All of the choice grade raisins produced at Eksteenskuil are exported to Traidcraft via the fair-trade initiative (Category 1). The characteristics of this channel are very similar to Category 3 for the commercial farmers. The only difference is that Category 1 represents the export of raisins via the fair-trade initiative. A system of traceability ensures that only raisins produced by members of the Eksteenskuil Agricultural Cooperative are exported via the fair-trade initiative.

The above discussion covered the flow of the physical product from the farmer to the consumer. Information, however, typically flows in the opposite direction. There is a flow of information from the processors to the producers. SAD, for example, has a code of conduct that farmers need to adhere to if they want to deliver to SAD. The code of conduct relates to international

health and safety requirements. Eksteenskuil farmers too need to adhere to the code of conduct from SAD, but they also receive information from fair-trade with regard to the product that is exported through them. There are various rules and regulations regarding standards and business practices that have to be followed by Eksteenskuil farmers if they want to market their raisins through fair-trade. Information on the rules and regulations that have to be met is directly conveyed to the Eksteenskuil farmers.

Location of markets

Eksteenskuil farmers can buy all of their inputs at stores in Keimoes, which is within 10 km from their farms. Farmers who cannot find the necessary inputs in Keimoes can travel to Upington which is a much bigger city about 50 km away. As stated, Eksteenskuil raisin producers normally sell their raisins to SAD. Although the processing plant is located in Upington, SAD has a depot in Keimoes. Eksteenskuil raisin producers thus only have to transport their raisins for about 10 km to Keimoes. Both the inputs and the output markets can thus be considered to be within a reasonable distance from the farms. Thus, while the distance to the market was found in the literature to be a major stumbling block to the participation of emerging farmers in commercial agri-food chains, the farmers from Eksteenskuil are not hampered by the distance to the market.

Infrastructure at markets

The infrastructure at the input suppliers and the processing plants is considered to be of good quality. All the input suppliers and the buyers are privately owned companies and hence are responsible for the infrastructure themselves. The general feeling amongst Eksteenskuil farmers is that the infrastructure at the input suppliers and their buyers is of good quality.

Road networks

Although the distance from Eksteenskuil to Keimoes is relatively short, the condition of the road network is a major problem for the farmers from Eksteenskuil. The poor condition of the roads also increases the cost of transportation. There was substantial improvement, however, in the quality of the roads at Eksteenskuil since 2010 when some of the roads were paved. Although the farmers from Eksteenskuil were initially exposed to the constraining impact of the poor condition of the road infrastructure as is the case for other emerging farmers that were found in the literature, government seems to be in the process of meeting its commitment in NDP (2011) to improve the road infrastructure in rural areas. There are still some roads, however, that are in an appalling state.

When considering the different components within the structure of the SCP framework, it is evident that the physical environment may have a constraining effect on the Eksteenskuil farmers. Although the environment is conducive to the production of raisins, the limited land sizes, lack of secure property rights of the land, and the poor quality of the water distribution

network suggest that the farmers do not operate within an enabling environment. On the other hand, when considering the structure from the market's side, there is less of a problem. The farmers from Eksteenskuil operate in a sophisticated value chain that allows them to earn maximum return on the grapes they produce. Within the next section the focus shifts to the behaviour of the value chain participants within the physical environment.

4.4.2 CONDUCT

The conduct component of the SCP analytical framework refers to the way participants operate within the physical environment. Again the conduct component is divided into farm conduct and marketing conduct. Those two forms of conduct are discussed next.

4.4.2.1 Farm conduct

Farm conduct is concerned with the cropping practices of the farmers under consideration, the types of farming techniques the farmers use and the sources and availability of credit to fund production activities.

Cropping practices

The crops that are currently extensively produced in the Eksteenskuil region are lucerne and grapes. Some farmers do have livestock but the livestock is only for domestic use. The lucerne that is produced is mainly used to feed the domestic livestock. Surplus lucerne, however, can be sold to a nearby feedlot located in Upington.

Although different crops are produced, the production of grapes serves as the main source of income for the farmers from Eksteenskuil. The climate along the Orange River is extremely suitable for grape production. The grapes that are produced in the area are for raisins, wine and grape juice. Although some Eksteenskuil farmers do produce a limited quantity of wine grapes, the Eksteenskuil community can mainly be considered to be raisin producers. Farmers from Eksteenskuil produce two cultivars (Sultanas and Merbein) that are closely related. After harvest, no distinction is made between the two cultivars.

Most of the farmers dry the grapes in the sun on cement slabs to produce Thompson's Seedless raisins (Figure 4.5). The cement slabs are normally close to the farm houses. Other farmers smoke the grapes with a sulphur solution and dry them on trays without exposure to the sun (Figure 4.6). Such raisins are golden in colour and are also called golden raisins.

Figure 4. 5: Grapes that are lying on a cement slab to be sun dried to become Thompson's Seedless raisins.

Figure 4. 6: Grapes packed on trays before being smoked with the sulphur solution to become golden raisins.

It is exactly the same types of grapes that are used to produce the Thompson's Seedless and the golden raisins. The only difference is in the way they are dried.

Farming techniques

Similar to most of the commercial farmers surrounding Eksteenskuil, the raisin producers from Eksteenskuil mainly use traditional farming techniques. Two of the major tasks associated with grape production include pruning and harvesting. Both tasks are highly labour intensive and are still carried out using manual labour. Some of the commercial farmers in the region have started to use a harvesting machine, but none of the Eksteenskuil farmers use such a machine to harvest their grapes. Tractors and implements, however, are used to a certain extent for the purpose of weed control, and chemical and fertiliser application.

In terms of irrigation technology, all Eksteenskuil farmers exclusively use flood irrigation to irrigate their vineyards. The vast majority of commercial farmers on the surrounding farmers also use flood irrigation. There are currently also no prospects of converting to more sophisticated irrigation technology that might be more efficient than flood irrigation. The absence of such prospects may possibly be attributed to the perception of abundant available water, and also findings from a study by Myburgh (2005) who observed that flood irrigation is an efficient irrigation method in the Eksteenskuil region given the current infrastructure.

Credit

Similar to the majority of emerging farmers in South Africa, access to finance is a major challenge in the case of Eksteenskuil raisin producers. Farmers from Eksteenskuil indicated that they have to apply for credit from commercial credit providers when they need funds to finance production inputs. Commercial credit providers, however, require collateral from the applicants before they would consider the application. There are some farmers who do obtain commercial credit to finance production activities. However, given that about 60% of the farmers do not have the title deeds for their land, few farmers have the ability to list their land as collateral for a loan. Given that the typical emerging farmer from Eksteenskuil can be considered to be resource poor, those farmers who do not have the title deeds for their land also do not have any other assets that qualify as collateral for commercial credit.

The lack of access to credit has some serious implications for the farmers. The general age of vines at Eksteenskuil is in excess of 30 years. The economic lifespan of the Sultana grapevines at Eksteenskuil is about 25 years. The lack of access to credit means that farmers are unable to replace their old vines. Keeping in mind that the establishment cost of vines is in the region of R108 000 per hectare (Vinpro, 2008), emerging farmers without access to a considerable amount of credit will not be able to replace their old vines. The older the vines get, the smaller the yields, which will lead to even more cash flow problems for the farmers. The lack of access to credit clearly has a major negative impact on the long-term sustainability of the raisin producers at Eksteenskuil.

In order to assist individual farmers to overcome the credit constraint, the EAC attempted to get credit from commercial banks with the idea to use that credit to provide soft loans to members of the co-operative. However, the EAC has also failed to obtain credit since it is a relatively new organisation and does not yet have a reputable credit record. The situation at Eksteenskuil thus corroborates the findings in the literature that access to credit is a major stumbling block that negatively affect the performance of emerging farmers, and hence the ability of emerging farmers to participate in commercial agri-food chains.

4.4.2.2 Market conduct

Market conduct is concerned with the behaviour of the farmers with regard to the marketing of their crops. More specifically, market conduct is concerned with the sources and availability of market information, the specific ways prices are formed, the level of research and development of new products, the level of investment in new technology and in training and services, the behaviour of the traders in the market, the level of competition in the market, contracting, and the marketing strategies that are followed by the farmers.

Market information

Price information is readily available during the season and raisin producers have a very good idea about the price they are going to receive for their raisins even prior to harvesting. SAD normally holds a road show around the end of the year with information sessions with the farmers where they discuss the market trends and price expectations. Whenever there is a change in the price, SAD sends a price list to the office of the EAC. Individual raisin producers from Eksteenskuil can get their market information via the office of EAC, or they can phone SAD or any of the other processing companies to find out what prices they would offer for the raisins. Farmers also get SMS-notifications from SAD whenever prices change.

Market information for the raisins to be exported is less readily available. International production information is published regularly in Foodnews, which is a subscription-based magazine. Subscription fees, however, are expensive for individual farmers. The processing companies, who export the bulk of the raisins, subscribe to the Foodnews and then distribute the relevant information to the farmers. The fair price to be paid by the fair-trade affiliated buyer is negotiated between the buyer, SAD (as the fair-trade processor) and the chairperson of EAC, and is based in part upon the information published in the Foodnews. The farmers from Eksteenskuil thus seem not to be that much constrained by the lack of market information as was found for other emerging farmers in the literature. The relationship between SAD and the farmers from Eksteenskuil may also possibly contribute to the smaller impact.

Pricing

Individual farmers from Eksteenskuil have no influence over the price they receive from SAD. The price SAD is willing to pay for the raisins is based on market trends and general supply and demand conditions (Koch, 2009). SAD publishes a price list even before the harvest, so farmers know the price to be received for their raisins when they deliver. The price determination process, however, is a continuous one. Whenever a new signal is received that may influence the price, SAD meets again and revises the current prices. Every time the price is adjusted, a new price list is distributed to the depots and farmers receive the new price (Koch, 2009).

In the case of Eksteenskuil, there is another price that is of importance. One of the aspects of fair-trade is that the previously marginalised producers must get a higher than market price for their produce. That price is negotiated with a fair-trade affiliated company such as Traidcraft. In the case of Eksteenskuil, SAD was responsible for negotiating the fair price with Traidcraft. There is an effort, however, to include Eksteenskuil farmers in the negotiation process, and indeed to include Eksteenskuil more and more in the exporting activities as is required by FLO. With regard to the fair price, the fair-trade affiliated company then pays the negotiated fair price to SAD who in turn pays it over to the farmers in the form of a second payment. By implication, the Eksteenskuil raisin producers receive a higher price for their produce than commercial farmers in the region.

SAD also has another initiative with regard to pricing. They now offer farmers a “risk share” marketing strategy where farmers are guaranteed a floor price for their raisins and then they are allowed to benefit from positive price movements. The floor price is typically a little lower than the market price at that stage. A farmer who takes part in the risk sharing strategy is guaranteed the floor price. If the price should decrease to a level lower than the floor price, the farmer will receive the floor price as stated in the contract. However, if the price should increase to a level higher than the floor price, they will share to a certain extent in the price increase. SAD uses a mathematical formula to determine the specific percentage of the increase that is paid to farmers. Although the farmer only receives a share of the increase in price, the risk sharing model allows him to benefit from positive price movements. For farmers to participate in the risk sharing there is a strict deadline for them to sign a contract. Only those farmers who have signed the contract are allowed to participate.

Research and Development

Active research is conducted at industry level in terms of new technology, especial for improving the varieties of vineyards to increase yields. The development of varieties for vineyards is undertaken by research organisations such as the Agricultural Research Council (ARC), and normally goes through long intensive trials under different weather conditions. Such investment cannot be done by famers alone hence research and development is either done at input level by input developers or at processing level by processors. Some desktop research, however, is conducted by some of the board members of EAC. For instance, the chairman does research by obtaining more information on any product or project that may be adopted by EAC farmers for diversification purposes (Kok, 2009).

There are also quite regular feasibility studies that are conducted in the Eksteenskuil region. Two of those studies have included the Development Bank Southern Africa (DBSA), who appointed a consultant to conduct a feasibility study for the expansion of vineyards. Secondly, a consultant was contracted to assess the feasibility of the dam water capacity. Overall, the

current research within the raisins industry proves to be in line with the recommendation in NDP (2011) to focus research and development on new technology.

Investment in new technology

A relatively newly developed technology that is available to Eksteenskuil raisin producers is the new cultivar, Merbein. Merbein was developed in Australia and is closely related to the Sultana, which is predominantly produced in the area. The major advantage of Merbein is that, while Sultanas are known to be low yielding every other year, Merbein has consistent high yields year after year. It is also argued that Merbein require substantially less water to grow the crop (Brink, 2008). Despite the availability of the technology, few Eksteenskuil farmers are producing Merbein since they cannot afford the replacement costs. Currently it is estimated that the establishment cost for raisin vineyards is about R108 000 per hectare. Eksteenskuil farmers who do not have access to credit cannot afford to replace their current, old Sultana vines with Merbein. The concern regarding the fact that the focus of research and development only on sophisticated technology may exclude emerging farmers from benefiting from investments in research and development thus proves to be valid.

Agricultural technology is expensive and normally designed for large scale commercial agriculture with large areas of land. EAC was established, amongst others, to help farmers to access technology at low cost for production purposes. Since farmers dry grapes themselves, they have invested in drying technology such as drying trays which allows easy handling of dried produce. EAC itself does invest in tractors and implements which then can be rented by the individual farmers to perform certain activities. There are strict guidelines, however, that have to be followed when using the tractors and implements.

The investment in technology at processing level is huge and expensive to maintain. The nature of raisins puts additional pressure on the processing company to ensure compliance with international health and safety standards. As an example, most of the processing companies use laser technology to eliminate foreign objects that may have been absorbed by the raisins. Given the high cost of a laser machine, not even the group of Eksteenskuil farmers collectively are able to afford one. Economies of size only allow processors to own the required processing technology.

Investment in technical training and service

A high value is placed on the investment of technical training and service at Eksteenskuil. EAC organises a number of training sessions per year for the farmers. Training has been conducted by various organisations such as, amongst others, SAD, Agriculture Research Council (ARC) Infruitec-Nietvoorbij, Sandra Kruger Consulting Services (EAC, 2009). ARC and Infruitec-Nietvoorbij provided training in the development of a central irrigation scheduling system and then also extended the training in the application of the system. SAD provides continuous

training and expertise in the management and production of grapes. Sandra Kruger Consulting Services has provided individual farmers with training in financial record keeping, and in 2010 was also contracted to assist EAC with a strategic planning session for the EAC as an organisation. EAC themselves also invested in training one of the youths from Eksteenskuil by awarding a bursary to the student for tertiary education in vine management. The idea is to contribute to the training of the student, who can then return to Eksteenskuil to perform extension services to the community.

One of the main reasons for the active investment in training and services by EAC is that, as the Premium Committee, EAC has the responsibility to use the social premium for social, economic and environmental development. EAC thus has the funds to pay for training services to contribute to social and economic development in the region. SAD also has a vested interest in the performance of Eksteenskuil farmers since it has a direct impact on the benefit SAD receives from being the only fair-trade affiliated processor. SAD has technical advisors who assist farmers to contribute to the farmers being able to produce the maximum volume of choice grade raisins that can be exported via the fair-trade initiative.

Behaviour of traders in the market

Raisin production is strictly seasonal, with the whole raisin harvest taking place from January to the end of March. Farmers deliver the raisins in 500 kg containers to the processing plant. The processing companies supply the containers to the farmers. Although the production of raisins is seasonal, the nature of raisins allows for them to be processed, packed and stored for a considerable period of time. The primary processing company typically buys the raisins from the farmers, stores them, and process and pack them upon orders throughout the year. Only a small proportion of raisins are sold to retailers to be sold as raisins. The bulk of choice grade raisins is exported, while standard and industrial grades are sold to secondary processors that use the raisins as ingredients in the bakery industry.

Competition

Historically, SAD was the only processor of raisins in the region. The deregulation of the agricultural commodities market has seen the rise of five additional processing companies (Carpediem, Fruits du Sud, Redsun Raisins, Kalahari Raisins, and the Raisin Company). The processing market for raisins still is very concentrated. Processing companies are reluctant to provide information on the volumes of raisins that are processed, but it was mentioned that SAD normally processes about 50% of all the raisins in the area. Given that the facilities at SAD were established with the aim to be able to handle the whole harvest along the Orange River, the establishment of each additional processing plant increases the competition for raisins produced in the area. The general understanding is that the current processing capacity along the Orange River is double the volume of raisins that is produced. Such competition has placed substantial upward pressure on the farm prices for raisins.

Contract

Eksteenskuil farmers who want to participate in the fair-trade initiative are obliged to enter into a contracting agreement with both SAD as the processor, and Traidcraft as the fair-trade affiliated buyer. The contracts relate to the specifications type of contract (Peterson *et al*., 2001) where the prices, volumes and quality are specified on the contract.

Interestingly, few commercial farmers enter into contracting relationships with any of the processing companies. This reluctance of farmers stems from the high level of competition between processing companies for the raisins in the area. Given that the processing capacity is double the production capacity, farmers believe that they will always have a buyer for their raisins. They are more concerned that they may miss out on higher prices from other processors if they enter into a contract with a specific buyer.

Marketing strategies

Eksteenskuil producers who market their produce through fair-trade employ a number of marketing strategies. As a product strategy, Eksteenskuil farmers ensure that the product is of a good quality since it is only choice grade raisins that are exported under the fair-trade label. Collectively, Eksteenskuil farmers also use standardised packaging where each box of raisins is packed in a carton that has the FLO label on each of the four sides of the box.

The second marketing strategy that is used for marketing the Eksteenskuil raisins relates to branding. Fair-trade is a brand itself. The Eksteenskuil raisins are marketed as the Fair-trade brand. The brand tells the consumer what to expect with regard to the product. The fair-trade product tells the consumer that the product was produced by a previously marginalised producer who now has received a fair price for his product.

Finally the Eksteenskuil producers can also be considered to use a channel strategy as a marketing strategy. The channel that they use for marketing their raisins through fair-trade gives them access to a niche market that cannot be used by non-members.

From the above discussion, one can see the influence of the structure on the behaviour of the economic agents. Similar to the influence of the structure on the conduct of the agents, the structure and conduct again have a major influence on the level of performance of the economic agents. The performance of the agents related to raisin production in Eksteenskuil is discussed next.

4.4.3 PERFORMANCE

Performance is regarded as a measure of success. The performance component is concerned with the level of success that the participants display (conduct) within the physical environment

(structure). The performance component, more specifically, is concerned with the volumes of raisins produced, and the income and costs of the farmers.

There has been a general decline in the volume of raisins produced by Eksteenskuil farmers over the past three years. In 2006, the total volume of raisins delivered by members of EAC was about 650 tonnes, followed by deliveries of 540 and 450 tonnes respectively during 2007 and 2008. There are a number of reasons for the decline in volumes. First and possibly the most important is the fact that the general age of vineyards in Eksteenskuil is in excess of 25 years with a large proportion being older than 30 years. Keeping in mind that the economic lifespan for vineyards is about 20 to 25 years, one would expect the yields to decline. Furthermore, most Eksteenskuil farmers do not have the necessary cash flow to buy inputs such as fertiliser and pesticides. The decline in the volume of raisins is therefore expected, but it is a major source of concern. The poor performance of the farmers from Eksteenskuil also corroborate the findings by Van Averbeke, Denison, and Mnkeni (2011) who found that most smallholder irrigation schemes perform well below its potential when reviewing research on the topic of smallholder irrigation schemes in South Africa.

Despite the general decline in the volumes of raisins produced by Eksteenskuil farmers they can still be considered to be the best paid raisin producers in the world (Koch, 2009). The ultimate price that Eksteenskuil farmers receive for their produce includes the price they receive from SAD, the fair price they receive from fair-trade, and then there is also the fair-trade premium. If you add it all together, the actual price is considerably higher than the price commercial farmers receive. Thus, the higher price may to a certain extent compensate for the lower volumes. However, although the price per kilogram is higher, the low levels of production mean that the farmers do not generate income that is sufficient to get them out of poverty. The poor condition of the physical environment thus proves to be a major constraint to the performance of the Eksteenskuil farmers.

4.4.4 DISCUSSION

From the SCP analysis one may conclude that the physical environment and the behaviour of actors within the market constrain the performance of the Eksteenskuil raisin producers. Although the natural environment is very conducive to the production of good quality raisins, the raisin producers from Eksteenskuil face similar constraints that act as barriers to entry that normally exclude emerging farmers from participating in commercial agri-food chains. However, contrary to the successful exclusion of emerging farmers from participating in commercial agri-food chains, the Eksteenskuil raisin producers do operate in a sophisticated value chain despite the stumbling blocks they face. The farmers get a good income from the choice grade raisins that are exported via the fair-trade initiative, and the role of the private sector, especially SAD and Traidcraft, is also very evident. The fair-trade initiative created an

incentive for SAD and Traidcraft to actively support the farmers from Eksteenskuil to meet the stringent quality requirements for the export of the raisins. Despite the relatively high income earned by Eksteenskuil farmers for their choice grade raisins, a cause for concern is the steady decline in the volumes of raisins that are produced. The SCP analysis shows that the decline may be caused by the constraints posed by the farmers' physical environment. Thus, although the farmers from Eksteenskuil are currently able to overcome the constraints associated with the physical environment, such efforts likely will not be sustainable. Recommendations by NDP (2011) to improve road and communication infrastructure and to transfer secure tenure to farmers in rural areas, and government's commitment to do so already in 2009 through CRDP (2009), have to be implemented without further delay. Similarly, the plan of government to make credit available to emerging farmers through the Micro-Agricultural Finance Institutions of South Africa (Mafisa) scheme (CRDP, 2009) also has to be implemented promptly. Failure by government to comply with its own recommendations and commitments may cause the once success story at Eksteenskuil to cross-over to the bulk of failures that are documented in the literature.

The next section is concerned with the New Institutional Economics analysis of raisin production and marketing by Eksteenskuil raisin producers in order to gain insight into the reasons why the farmers behave the way they do.

4.5 NEW INSTITUTIONAL ECONOMICS ANALYSIS OF RAISIN PRODUCTION AND MARKETING BY EKSTEENSKUIL RAISIN PRODUCERS

The NIE analysis is a theoretical approach to investigate the reasons why economic actors operate the way they do within a value chain. The NIE framework consists of four levels. The highest level (Level 1) is concerned with the social embeddedness of the actors under consideration, followed by the level that is concerned with the institutional environment (Level 2), governance structures (Level 3) and resource allocation (Level 4).

4.5.1 SOCIAL EMBEDDEDNESS (LEVEL 1)

Social embeddedness refers to customs, traditions, and societal norms that affect the behaviour of the economic agents under consideration. The social embeddedness of Eksteenskuil farmers is assessed first by describing the historical background, polities and internal politics as informal constraints on the behaviour of the farmers. Then follows an analysis of the social capital of the farmers under consideration to get an understanding of their levels of social capital, and the factors that affect the social capital of the Eksteenskuil raisin producers.

4.5.1.1 Cultural norms and traditions

Historical background

Eksteenskuil is an Act 9 area (Rural Coloured Settlement). The land in Eksteenskuil is held in trust by the Minister of Agriculture and Land Affairs. The first Coloured families were settled in Eksteenskuil during the 1920s, and they had to lay out the land, clear it for vineyards and build the infrastructure themselves. The rest of the families were awarded plots only during the mid-1950s after the white farmers who were cultivating the land by that time were bought out and relocated else ware. The political past of South Africa means that the political environment has a direct impact on the Eksteenskuil community. Thus, the level of social embeddedness in Eksteenskuil is expected to have a major influence on farmers' behaviour and performance. The next section covers a discussion of the impact of politics on Eksteenskuil and also Eksteenskuil farmers' perceptions regarding politics and politicians.

Polities

When communicating with farmers within Eksteenskuil there is a general feeling that the Eksteenskuil community does not have a lot of trust in the government. This is mainly centred around the fact that Eksteenskuil farmers feel that they do not receive any form of assistance from government and even that they are being marginalised.

One of the main reasons that Eksteenskuil farmers perceive government to be marginalising them relates to the TRANCRAA (Transformation of Certain Coloured Rural Areas Act) process. The TRANCRAA process was initiated after the removal of the apartheid government with the aim to decide on what should happen to remainder land. In the case of Eksteenskuil, consultants were appointed to investigate the situation and they had to advise the Minister regarding the use of remainder land. As far as community participation was concerned, that process was completed in Eksteenskuil during November 2005 with a referendum being held where it was decided that the remainder land should be in the control of the community. However, the Minister had to conclude the process and transfer the land to its rightful owners. The problem, according to Kok (2008), is that the process was never concluded by the Minister and the land has still not been transferred. In addition to the lack of closure, communication with the Minister is redirected to local government, where still no progress is made. Similarly, enquiries directed to the Director General of the National Department of Agriculture (NDA) get redirected to the Deputy Director General, who in turn does not respond to the enquiries (Kok, 2008). Such behaviour is then perceived as the unwillingness of government to work with the Eksteenskuil community, and causes Eksteenskuil farmers to have very little trust in the government.

Another reason for Eksteenskuil farmers to perceive government to be unwilling to assist them relates to a hail storm in December 2002. According to Kok (2008), there was a severe hail

storm at Eksteenskuil on 21 December 2002. Despite requests from Eksteenskuil for the government to assess the damage, the MEC (Member of Executive Council) only visited the region on 6 March 2003. During his visit he ordered the community to "put something on his table by 16:00 tomorrow". They asked the MEC to declare Eksteenskuil a disaster area. The MEC, however, decided not to. Then in 2003 the Eksteenskuil community held a demonstration in town, but no one came to collect their memorandum. That led to mudslinging between Eksteenskuil and the Department of Agriculture in the media. According to Kok (2008), there were farmers even five years later who were still waiting and thinking they would receive some compensation from government. Kok (2008) concludes that there seems to be some evidence that the politicians may capitalise on the ignorance of people, or that public funds have become a political tool.

Similar views are held by Brink (2008), who was the extension officer who worked closely with Eksteenskuil farmers from the 1980s. Brink (2008) gave a brief description of the process that needs to be followed for a community project to be implemented. Firstly you have to meet with the community board and explain to them what the project is about and what the proposed outcomes might be. Once they agree that such a project should be implemented the board then has to go to the community and inform them about the proposed project. Once the community agrees to it, the community board, together with the official who proposes the project, go to the Department of Agriculture. If the Department of Agriculture agrees that the project should be undertaken, they meet with the Minister of Agriculture who in turn will take the matter to parliament. Brink (2008) emphasises that a project will only be implemented if it has been approved at all levels. Brink (2008) goes on to state that the process normally goes smoothly until the Department of Agriculture is on board. It is usually at the local government level where the process becomes more of a challenge. Brink (2008) argues that politicians' reluctance to support such projects may be due to the fact that, if the politician does support a project that is not supported by the political party, he simply gets redeployed or may even lose his job. Thus there seems to be a disincentive for politicians to take the responsibility and support projects aimed at improving rural livelihood. The number of projects that get shut down at local government level enhances the perception that government is unwilling to assist the Eksteenskuil community.

In addition to the above, Brink (2008) states that certain organisations contacted him previously to find a way in which they could assist the Eksteenskuil community. Brink (2008) says, however, that he normally warns such organisations that they will have to get approval from government before they try to implement any project. Some of those organisations have indicated that they actually have contacted the government but did not get any response even after two years. Again Brink (2008) concludes that the projects generally fail due to the lack of buy-in by politicians. The lack of co-operation from government enhances the negative perception Eksteenskuil farmers have of government.

From the above, there seems to be evidence that the Eksteenskuil community does have reason to feel that they are being marginalised. In addition, there is also some internal politics that affects the dynamics of the Eksteenskuil community. The next section covers some of the internal politics that exists in Eksteenskuil.

Internal politics

Recall that the people were settled as a community in Eksteenskuil. The major idea with regard to such a community is the fact that the community rules (Kok, 2008). A community board is elected only to serve as a mouthpiece for the community. Clearly a problem is likely to arise if the community perception is that board members make decisions that cause the board members themselves to benefit from such a decision. That was also the case in Eksteenskuil. Community members believe that some of decisions made by the board were to their own direct benefit. The problem is that, although there is not necessarily proof that the accusation is true, if the community thinks that a board member is benefiting unfairly they will become aggrieved. Such perceptions normally lead to a reshuffle in the people serving on the board.

Another potential cause of internal political instability relates to only some individuals from the community benefiting from projects. Again this scenario occurs in the case of Eksteenskuil. Recently there was a project where Orange River Wine Cellars (OWC) in conjunction with the National Department of Agriculture (NDA) proposed to establish new vineyards at ten of the poorest farmers. The community itself needed to identify the ten participants which already caused a number of community members wanting to be considered amongst the ten poorest. The problem was inflated when the number of beneficiaries was reduced to six, and later only to four. Moreover, one of the four beneficiaries is a member of EAC that was co-opted as one of the board of directors of OWC. Such behaviour has a major negative impact on the dynamics within a community such as Eksteenskuil. Thus, one should guard against singling out some individuals who will benefit monetarily from a project at the expense of other members in the community (Kok, 2008).

The above discussions show that the political environment, both internal and at a national level, does have an influence on the community of Eksteenskuil. The current political environment within Eksteenskuil is expected to have a major impact on the level of trust amongst community members, as well as community members' level of trust in government. Since trust forms a major component of social capital, the level of social capital of Eksteenskuil raisin producers is expected to influence their behaviour and performance. It is important to note, however, that the above discussion includes the views of only a small number of people within the community.

4.5.1.2 Social capital

Social capital consists of structural and cognitive social capital (Krishna and Shrader, 2000). While structural social capital refers to the participation in formal organisations, cognitive social capital is concerned with the levels of trust and the level to which an individual feels that he/she associates with other people in the community. The levels of cognitive social capital for raisin producers from Eksteenskuil is measured based on the level (on a five-point Likert scale) to which respondents agreed with a number of statements that serve as proxies for social capital. Structural social capital is measure based on individuals' participation in formal organisations. The first step when analysing the levels of social capital is to investigate the dimensions underlying the social capital of Eksteenskuil raisin producers. The dimensions are investigated by means of factor analysis of the farmers' responses to the above mentioned statements. Thereafter social capital indices are compiled for each individual.

Factor analysis to investigate dimensions underlying social capital of raisin producers from Eksteenskuil

Given that all of the statements aim to measure the same underlying factor (cognitive social capital), factor analysis was used to investigate the underlying structure in the responses to the questions aimed at measuring the levels of cognitive social capital of respondents.

Based on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, 13 of the original 20 questions were deemed to measure the same underlying aspect and were included in the factor analysis. Using the eigen-value criteria (eigen-value of 1 is the cut-off value for the inclusion of a factor), four principle components had eigen-values greater than one and explain 72.5% of the variance in the farmers' responses to questions aimed at quantifying their levels of social capital. The 13 variables thus were grouped into four factors. All of the variables that were included in the analysis have commonalities greater than 0.5, with 10 of the 13 variables having commonalities greater than 0.7. The extracted factors thus explain in excess of 50% of the variation in each of the variables that were included in the analysis. The 13 variables thus do measure the same underlying aspect, and the four factors extracted with the factor analysis do represent all 13 variables to a satisfactory level.

Varimax rotation was applied to ensure that each variable loaded high on as few factors as possible. The rotated component matrix is presented in Table 4.1. From Table 4.1 can be seen that none of the variables have factor loadings greater than 0.5 in more than one factor.

Table 4. 1: Rotated component matrix[1] to show the dimensions underlying social capital of raisin producers from Eksteenskuil.

	Component			
	Institutional trust	Core trust	Informal network	General trust
I trust the legal system	**0.843**	-0.090	0.109	0.215
I trust the municipal government	**0.813**	0.111	-0.043	0.062
I trust the police	**0.786**	0.231	-0.201	0.077
I trust the board of EAC	**0.603**	0.149	0.132	0.457
I trust my friends	-0.025	**0.828**	0.182	-0.007
People are trustworthy	0.112	**0.824**	-0.041	0.292
I trust other farmers	0.256	**0.722**	0.283	0.253
I'm trustworthy	0.275	**0.524**	0.120	0.411
I get along with my friends	-0.250	0.195	**0.837**	0.078
I get along with my family	0.284	0.024	**0.805**	0.150
I get along with other farmers	-0.148	0.493	**0.641**	-0.210
I trust the church and its people	0.228	0.231	-0.226	**0.823**
I feel safe in my neighbourhood	0.115	0.140	0.266	**0.813**

[1] Rotation converged in six iterations

Table 4.1 shows that the variables that loaded high in the first factor include “I trust the legal system”, “I trust the municipal government”, “I trust the police”, and “I trust the board of EAC” (Eigen-value of 4.41). The first factor thus indicate that a person who trusts the legal system normally also trusts the municipal government, the police and the board of EAC. Given the respective variables that load high in the first factors, Factor 1 was called “institutional trust”.

The variables that load high in the second factor include “I trust my friends”, “People are trustworthy”, “I trust other farmers”, and “I’m trustworthy” (Eigen-value of 2.60). A person who believes that people generally are trustworthy also believes that he himself is trustworthy, and he also trusts his friends and other farmers. The second factor was called “core trust”.

“I get along with my friends”, “I get along with my family”, and “I get along with other farmers” loaded high in the third factor (Eigen-value of 1.36). A person who gets along with his friends thus also gets along with his family and other farmers in the region. Since all of the variables are concerned with the level to which the farmer gets along with other people, the third factor was called “Informal networks”.

The last factor contains “I feel safe in my neighbourhood” and “I trust the church and its people” (Eigen-value of 1.06). A person who trusts the church and its people thus also feels safe in his neighbourhood. The fourth factor was called “general trust”.

Cronbach’s Alpha was calculated for each of the extracted factors to assess the reliability of internal consistency within each factor. The first factor had a Cronbach’s Alpha value of 0.81,

and Factors 2, 3, and 4 had Cronbach's Alpha values of 0.80, 0.73, and 0.69 respectively. The high Cronbach's Alpha values suggest that the internal consistency in all four factors is reliable and hence each item is measuring the same concept as the overall factor. The Cronbach's Alpha value of all the social capital statements altogether is 0.83. The high value of the Cronbach's Alpha on all of the variables that were used as proxies for social capital suggest that there is consistency between all of the statements that were used to measure the level of social capital of the raisin producers from Eksteenskuil.

Compiling social capital indices for raisin producers from Eksteenskuil

- Cognitive social capital

The values of the indicator that represents cognitive social capital range from zero to 50. A value of zero indicates no cognitive social capital, and a value of 50 indicates full cognitive social capital. The average value for the standardised cognitive social capital index is 36.5, which is relatively high. When looking into more detail in the respective components of the cognitive social capital index shown in Table 4.2, one can see that the average scores for institutional trust and core trust are greater than 10, while the average scores for Informal networking and general trust are 7.19 and 3.27 respectively. This suggests that the cognitive social capital levels of raisin producers from Eksteenskuil are mainly driven by the core trust of farmers, and the levels to which they trust government, the police service, the legal system of South Africa and the board of directors of EAC. The role played by trust in social capital is thus evident at the case of Eksteenskuil.

Table 4. 2: Descriptive statistics of farmers' scores for factors representing cognitive social capital.

Standardised social capital factor	Average	Minimum	Maximum	Stdev
Institutional trust	10.14	1.39	20.65	4.45
Core trust	11.21	2.56	20.65	3.95
Informal networking	7.19	2.91	10.42	1.81
General trust	3.27	0.21	4.89	1.01

T-tests were used to statistically compare the means of the respondents' social capital scores for each of the factors extracted with the factor analysis. Except for the mean values for institutional trust and core trust, all of the means of the respective factors are statistically different at a 1% level of significance.

- Structural social capital

The levels of structural social capital of raisin producers from Eksteenskuil were measured as the sum of their participation in formal organisations. A value of two was given to those

respondents who indicated that they are active members of the organisation, a value of one to inactive members, while non-members scored a value of zero. The structural social capital of the farmers is also standardised to a value of 50. A value of 50 indicates full structural social capital (an active member of all of the listed organisations), while zero indicates no structural social capital (non-member of all of the listed organisations). The average score for the standardised structural social capital index of raisin producers from Eksteenskuil is 30.9 which is statistically significant lower than the average score for the cognitive social capital ($p<0.01$).

When looking in more detail at the respondents' participation in formal organisations (Table 4.3), one can see that the average scores for members of the farmers' co-operative and members of farmers study groups are the highest (13.41 and 12.61 respectively), followed by membership in religious groups (9.43), and political parties (3.83) respectively. The high level of active participation in the farmers' organisations (co-operative and study groups) is expected since farmers from Eksteenskuil who want to benefit from the fair-trade initiative are obliged to be a member of EAC.

Table 4. 3: Descriptive statistics of farmers' participation in formal organisations.

Formal organisation	Average	Minimum	Maximum	Stdev
Farmers' co-operative	13.41	0	22.22	4.42
Farmer study group	12.61	0	33.33	11.21
Religious / Church group	9.43	0	11.11	3.10
Political party or group	3.83	0	16.67	4.64

There is no statistically significant difference in the mean score for farmers being members of the farmers' co-operative and being members of farmer study groups ($p<0.67$). The difference of the mean score for being a member or the farmers' co-operative and being a member of a political party, and being a member of a religious group is significant ($p<0.01$). Similarly there is also a statistically significant difference in the means score for being a member of a farmer study group and being a member of a religious and political group respectively ($p<0.01$). Although some farmers are members of other organisations, there is a clear incentive for farmers to participate in the farmers' organisations.

A cumulative probability distribution function (CDF) graph is drawn from the respective standardised social capital indices to get a better understanding of the difference in the structural and cognitive social capital of raisin producers from Eksteenskuil. The CDF graph is shown in Figure 4.7.

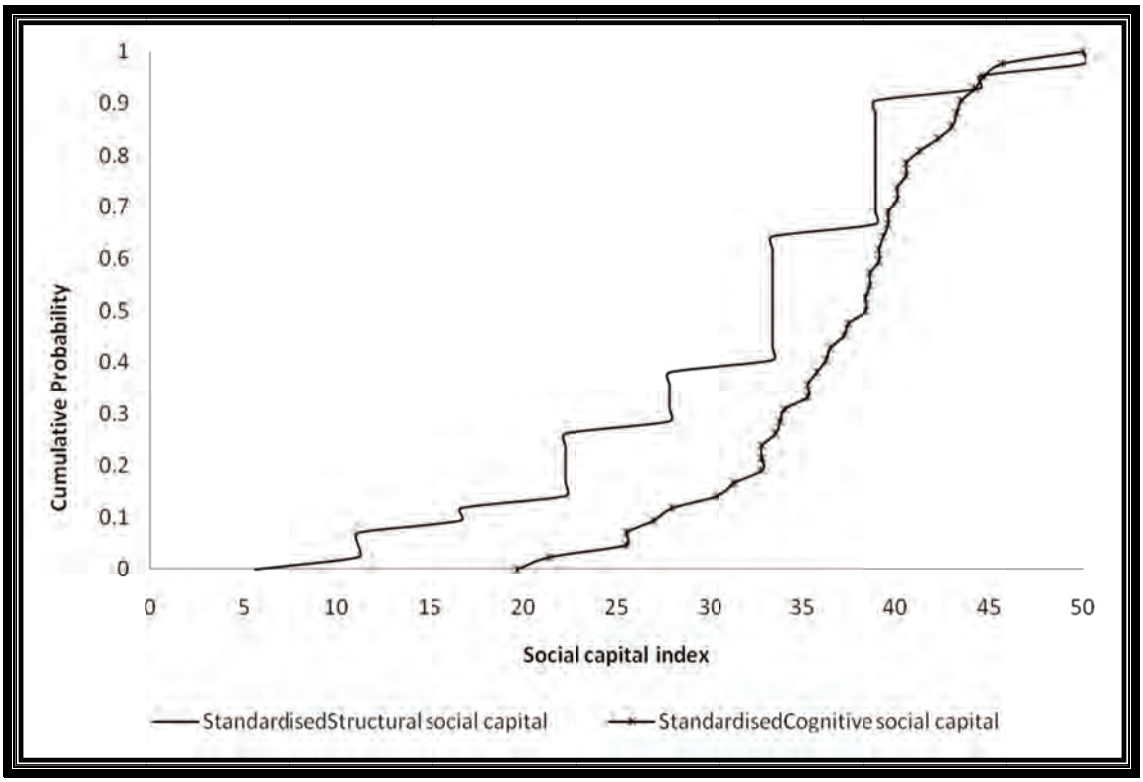

Figure 4. 7: Cumulative probability distribution of the standardised structural and cognitive social capital of raisin producers from Eksteenskuil.

Figure 4.7 shows that the CDF for cognitive social capital lies to the right of the structural social capital. While the minimum score for the cognitive social capital is about 20, the minimum for structural social capital is about five. Thus, although farmers may have indicated relatively high scores for the components in cognitive social capital that relates to trust (institutional trust, core trust and general trust), and for informal networking, they do not necessarily participate actively in the formal organisations in the community. Interestingly, there is no significant correlation between the levels of structural and cognitive social capital.

- Overall social capital

The overall social capital index is calculated by adding the standardised cognitive social capital index to the standardised structural social capital index of each of the farmers. An overall social capital index of 100 thus implies full structural and cognitive social capital, while a value of zero would indicate no structural or cognitive social capital at all. A CDF graph of the overall social capital index for raisin producers from Eksteenskuil is shown in Figure 4.8.

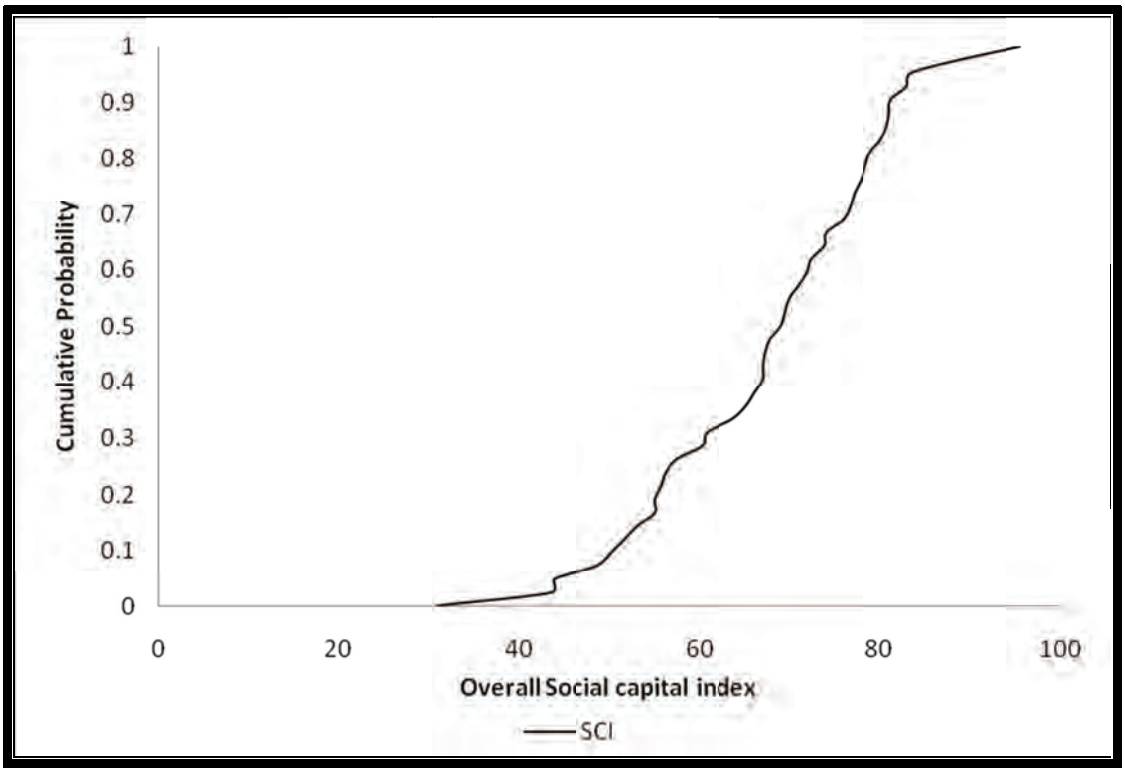

Figure 4. 8: Cumulative probability distribution of the overall social capital indices of raisin producers from Eksteenskuil.

The average score for the overall social capital index is 67.4 which seem to be relatively high. Figure 4.8 shows that the minimum overall social capital index achieved by a raisin producer from Eksteenskuil is about 30, while the highest index is about 95. Based on the results, none of the farmers from Eksteenskuil have full social capital, but also none of the farmers have no social capital at all.

The seemingly high levels of social capital of raisin producers from Eksteenskuil is good news since Eksteenskuil farmers can only benefit from the fair-trade initiative by working collectively. There seem to be generally high levels of trust and a sense of getting along amongst farmers and members of the community. The nature of the transactions through which raisins are sold is such that it does not put a lot of pressure on the trust relationships between individual farmers. Farmers have complete autonomy with regard to the production of their raisins and selling them to SAD as the fair-trade affiliated processing company. The collective action only occurs when the raisins are collectively exported by SAD to the fair-trade affiliated buyer. Farmers thus have no direct influence on the performance of other farmers in terms of the production of raisins. The challenge for the collective group of raisin producers is to collectively produce a sufficient volume of export quality raisins to ensure that it remains worthwhile for the fair-trade buyer to continue procuring raisins from Eksteenskuil.

Given the political environment within which the farmers from Eksteenskuil operate and the role of trust in the social capital of the farmers from Eksteenskuil, one may conclude that the social embeddedness of farmers from Eksteenskuil is expected to influence their behaviour within the raisin value chain. The fact that social embeddedness is not considered as a given in this study but rather was investigated in detail, allowed for important information to be generated with regard to the potential of collective action as a strategy to obtain economies of scale as recommended by NDP (2011). The next section gives a general description of the institutional environment that also influence the behaviour and performance of raisin producers at Eksteenskuil.

4.5.2 INSTITUTIONAL ENVIRONMENT (LEVEL 2)

The institutional environment contains all the formal and informal rules and regulations that influence the way actors behave within the value chain.

4.5.2.1 Formal institutions

Recall that the major aim of the formal rules is to provide protection against opportunistic behaviour of agents involved in the production and marketing of agricultural products. As mentioned, property rights is a major component of the formal rules that regulate production and marketing of agricultural products. This is especially true in the South African scenario where the issue of land ownership is very relevant due to the political past.

Land tenure

In the case of Eksteenskuil land tenure definitely is considered to be of the utmost importance. Eksteenskuil is an Act 9 area (Rural Coloured Settlement) as specified by the Rural Areas Act 9 of 1987 (repealed to the Transformation of Certain Rural Areas Act of 1998). Government initiated the Transfer of Certain Rural Areas Act (TRANCRAA) with the aim to distinguish between waste land and remainder land. The TRANCRAA process was completed already by November 2005, where it was decided that the land should be transferred to the individual farmers. However, all of the land still has not been transferred to the rightful owners. Consequently, only some of the farmers from Eksteenskuil do have freehold tenure, while most of the land is still held in trust by the Minister of Agriculture and Land Affairs with the farmers having to rent the land. Those farmers who have the title deeds for their land do have secure tenure, but none of the farmers who lease the Trust land from government was able to present a written lease agreement. The security of their tenure thus is questionable.

The lack of title deeds to the land has some serious implications for the farmers. Farmers who do not have the title deeds for their land cannot source commercial credit, nor can they sell their land to other prosperous farmers who want to increase the scale of their production

activities. Clearly the lack of title deeds does have a constraining impact on economic activity within Eksteenskuil by negatively affecting the ability and willingness of farmers to invest in their land. The impact of tenure insecurity at Eksteenskuil thus very much corroborate the findings in the literature that tenure insecurity is a major stumbling block that contributes to excluding emerging farmers from participating in commercial agri-food chains.

In addition to land tenure there are also some other formal rules and regulations that have to be met when producing and marketing agricultural products. Since most of those rules and regulations are generic to agricultural production and marketing in general, the focus of attention next will rather be on the rules and regulations that are specific to the case of Eksteenskuil.

Formal rules and regulations specific to the case of Eksteenskuil

The formal rules and regulations that are specific to the case of Eksteenskuil include the requirements that have to be met in order to export raisins via the fair-trade initiative, and also the rules and regulations specified in the constitution of EAC.

- Standards and requirements associated with the FLO

According to Kok (2008), the Eksteenskuil Farmers' Association (EFA) was established during 1994 with the aim to increase the lobbying power of Eksteenskuil farmers. With the assistance of a Non-governmental Organisation (NGO) EFA linked up with Traidcraft in the United Kingdom (UK). Since 1995, EFA started exporting some raisins on a small scale to Traidcraft in the UK. During 2003 EFA was inspected by the Fair Trade Labelling Organisation (FLO) after which they became FLO-accredited. Although the business practices of EFA already were based upon the principles of FLO, since their accreditation, EFA is required to meet some strict regulations referred to as the FLO-standards. The FLO-standards thus are the rules under which Eksteenskuil can do business in the fair-trade market. In order to ensure that all the requirements are met, EFA gets audited on an annual basis by FLO.

Despite having to comply with the strict regulations, there are some definite benefits to being a fair-trade producer. The FLO guarantees the producer a minimum price that is fair and sufficient to cover production costs as well as providing a reasonable return. In addition to the fair price, the group of producers also receive a Fair-trade Premium, which usually is between 7% and 15% of the total price of the product. The higher price and premium are made possible because some consumers are willing to pay more for products carrying the Fair-trade label.

An individual farmer, however, cannot become a Fairtrade producer himself. Small-scale farmers have to form an organisation which is able to contribute to the social and economic development of their members and their communities. Such organisations moreover can be certified by FLO only if they comply with the requirements of the Generic Fair-trade Standards

for Small Farmers' Organisations. In setting the standards, FLO follows certain internationally recognised standards, especially those of the International Labour Organisation (ILO). There are two basic requirements that small farm producers must fulfil in order to be certified as a fair-trade producers' organisation. Firstly there are minimum requirements that the producer organisation has to meet from the moment they join fair-trade. Secondly, there are progress requirements on which the organisation must show permanent improvement and a report of the progress requirements has to be submitted each year (Anonymous, 2008).

Of every fair-trade-certified product that is sold by the organisation, at least 50% of the volume must be produced by small producers. There are a number of specific requirements that have to be met during the production process by small-scale farmers. Firstly the organisation is expected to assess the environmental impact of its operations. They have to develop plans that are designed to decrease those impacts and also to monitor the implementation of those plans. Secondly fair-trade producers are expected to continually reduce the volumes and types of agrochemicals that are used in production processes. With regard to agrochemicals FLO publishes a list of materials that may not be used at all. The third requirement relates to fair-trade producers' handling of waste. Producers are expected to reduce, reuse, recycle and compost waste in a manner that is suitable to the materials in question. A plan should be established for the disposal of all hazardous waste materials and also for the sustainable use of organic waste. Producers are also expected to maintain and enhance the fertility and structure of soil, as well as manage water resources with the aim to conserve and not to contaminate. Fire should not be used in a manner that will be detrimental to the natural system. Finally they have to ensure that no genetically modified organisms (GMO) are used either in the production or processing of the product (Anonymous, 2008).

In addition to all the generic rules that have to be complied with there are also some standards that are specifically for dried fruit. These standards are frequently revised. These standards can be placed on three legs: social development, economic development and environmental development (Anonymous, 2008). The social development leg strives for members of the organisation to supply at least 80% of the fruit. Whenever fruit is grown by producers other than the members, the association must maintain a register of the suppliers and also develop a plan to increase the membership amongst suppliers. Moreover, suitable measure must be taken to increase the percentage of registered women growers and to promote their active role with regard to decision-making within the organisation.

As the second leg relates to economic development, the organisation must develop a plan to ensure that all suppliers benefit from the premium until 80% of the fruit is supplied by members. The producer organisation must show efforts to promote the marketing of other crops in order to decrease the economic dependency on one single crop and to provide

producers with additional sources of income. The organisation also must have the necessary infrastructure and capacity to communicate with, sell to and deliver to overseas markets.

Finally, the environmental development leg relates to the requirement that all dried fruits which are sold with the fair-trade label must have been produced by FLO-Certified Producers' Organisations. The minimum prices are defined per dried fruit product and per country, and the farmers will receive a fair-trade premium in addition to the fair price. Whenever the current market price is higher than the fair-trade minimum price, the market price will apply and the buyers of the fair-trade products will pay producer organisations at least the fair-trade minimum price as set by FLO.

With regard to the fair-trade premium, there are also some strict specifications that have to be met when spending the premium. The premium should be spent on things that improve the lives of the small farmers, farm workers and the community. In the case of a small farmer organisation, the premium can also be used to improve the business since it is argued that improving the productivity of the business may ultimately lead to increasing the benefit for the whole community. Those specifications thus ensure that producers invest in their farms and communities and also that the producers protect the environment. The premium is paid only once the co-operative or farming company has sold their produce and submitted a report which contains the volume sold, the price received and also the premium that was earned to the FLO (Anonymous, 2008). More specifically, the FLO gives five criteria that have to be met when using the fair-trade premium. Firstly, it is required to benefit the whole community rather than only individuals; secondly, the benefit should last at least five years. The third requirement states that the project needs to respond to the most urgent and basic needs of the workers, while the fourth requires that the benefit should also reach the families of the workers. Finally, the last requirement when spending the fair-trade premium states that the project also needs to bring an additional benefit to the community (Anonymous, 2008).

From the above it is clear that there are a number of strict rules and regulations that need to be met by Eksteenskuil raisin producers for them to continue benefiting from fair-trade. At first glance it thus seems that the stringent requirements may also exclude the farmers from Eksteenskuil from participating in the value chain as was found in the literature. The farmers from Eksteenskuil, however, do comply with the rules and regulations. A consultancy firm was contracted to assist the farmers with environmental impact assessments and to design the plans to decrease the impact of their actions on the environment. The EAC buys chemicals in bulk and makes available smaller amounts to individual farmers. By centralising the distribution of chemicals, EAC has control over the types and amounts of chemicals applied during production. EAC also converted an old shed to meet the requirements for disposing of the chemicals.

Although the regulations specify that a small proportion of non-members may deliver under the name of the accredited organisation, EAC decided that only members would be allowed to do so. Instead of allowing other farmers to deliver under its name, EAC invited other previously marginalised farmers within the region to become members. Women producers also have a major role to play at Eksteenskuil. Two of the five directors of EAC are women. EAC has also contracted Vinpro to conduct a feasibility study for wine production at Eksteenskuil. EAC aims to obtain FLO accreditation for exporting wine in order to reduce their dependence on raisins as their sole source of income.

In order to meet the requirements with regard to the spending of the fair-trade premium, EAC also serves as the Premium Committee. The projects where money from the premium has been utilised include equipping and maintaining of EAC's office; buying and maintenance of farming equipment; coordination and dissemination of agro-chemicals to individual farmers; organising farmers' days (twice yearly) and information sessions; funding of educational equipment for primary schools; funding of women's projects; organising and facilitating training of a group of women in tourism; workshops on basic business management (for farmers and non-farmers); and hydroponic training for a group of youths from the community. These projects meet the requirements specified by FLO. It is worth to note that, by actively contributing to skills development in the Eksteenskuil community in order to comply with the specifications for spending the Fair-trade Premium, EAC also meets one of the recommendations of NDP (2011) that will contribute to meeting the vision for 2030.

The conscious efforts by EAC and its members to comply with the stringent requirements to supply raisins to the fair-trade market may be incentivised through the fact that, at this stage, the benefit generated from exporting raisins via the fair-trade initiative outweighs the costs of complying with the requirements. The findings at Eksteenskuil thus show that the stringent quality requirements do not necessarily have to exclude emerging farmers from participating in commercial agri-food chains. If incentives are correctly aligned, farmers will make a bigger effort to comply.

In addition to having to comply with the rules and regulations as stipulated by FLO, the members of EAC also have to comply with the rules and regulations specified in the constitution of the co-operative. Some of those rules and regulations are discussed next.

- Formal rules related to Eksteenskuil Agricultural Cooperative (EAC)

After the 2006 audit, FLO enquired from EFA to explain what they plan to do with regard to their own exporting, since at the time the EFA sold the raisins to SAD who processed the raisins and sold them as their own. EFA thus was faced with a challenge that they had to start commercialising their operations as well. With that regard, EFA investigated a better legal entity and decided to become a co-operative. That decision was made through a participatory and

consultative process during 2006. Eksteenskuil Agricultural Cooperative (EAC) finally was registered in December 2006 (Kok, 2008). The objectives of the co-operative include the provision of an organisation with common property rights to people who were marginalised by the previous political regime in South Africa; to allow members to benefit from buying inputs and selling produce on a larger scale; and also to provide support and training to members.

One of the requirements of a co-operative as a business entity is that it must have a constitution. The constitution provides another set of rules that have to be met by the members of the co-operative. The constitution mostly consists of the general specifications and requirements that are common in the constitution of a co-operative. The constitution of EAC, amongst others, provides specific requirements that have to be met by farmers who want to become a member or cancel their membership of the co-operative; it stipulates the powers of the Annual General Meeting (AGM), the board of directors, and also the voting power of members; and it stipulates the requirements for a member to serve on the board of directors and the conduct of board members.

There are also a set of guidelines that have to be followed by members of EAC whenever they want to rent one of the implements under the control of EAC. A list of 21 guidelines is published by EAC which specifies the conduct related to renting and using communal implements. Another set of rules that have to be met by Eksteenskuil raisin producers relates to their relationship with SAD, who is considered to be a strategic partner. Recall that one of the requirements to be a fair-trade producer of dried fruit is that the producers' organisation needs to have the infrastructure to export the products. Due to the lack of infrastructure at Eksteenskuil, EAC actually outsources the exporting activities to SAD via their strategic partnership with SAD. This relationship too is governed by a set of rules and regulations that has to be met from both sides.

At this stage it is important to highlight a couple of interesting consequences of the farmers' endeavours to remain fair-trade producers of raisins. First and foremost, the farmers investigated the need for, and decided to change their collective business form from a farmers' association to an agricultural co-operative that is registered under the New Co-operatives Act of 2005. It is important to note that the decision to organise themselves as a co-operative was a business decision to enhance their access to the price incentives of the fair-trade initiative. Thus, while the Department of Trade and Industry (DTI) wants to incentivise emerging farmers to form co-operatives through gaining access to grants from the Co-operatives Incentive Scheme (South African LED Network, 2012), the case of Eksteenskuil shows that, by incentivising the farmers to improve their business, the farmers themselves decided to form an agricultural co-operative at Eksteenskuil. More importantly, the farmers have organised themselves as a co-operative in order to do business and not merely to get access to a government grant as is often the case with emerging farmers in South Africa. Ultimately, the

farmers from Eksteenskuil actually created additional rules themselves, instead of viewing the stringent requirements of the fair-trade market as an entry barrier that will exclude them. The case of Eksteenskuil thus shows that, by correctly aligning incentives, institutions can effectively influence the behaviour of emerging farmers that may give them access to commercial agri-food chains.

4.5.2.2 Informal institutions

The informal rules refer to the informal sanctions in the institutional environment, which consist of non-political, non-economic and unwritten conventions such as taboos, traditions, customs and norms. According to Adams (2011), Kok (2009) and the respondents to the study, there are no informal institutions at Eksteenskuil that affect the behaviour of the farmers. The only institutions that do affect the behaviour of the farmers are the formal institutions.

From the above discussion, it is evident that the farmers from Eksteenskuil have to comply with a number of strict rules and regulations if they want to benefit from fair-trade. Important to note, the institutions are strictly enforced and all farmers know that. If some farmers are found not to comply with the rules, EAC loses accreditation which means that none of the farmers will be able to benefit from fair-trade. The farmers, however, have a substantial financial incentive (fair-trade price and premium) to comply with those rules. The next section covers the assessment of the governance structures used by the farmers to understand the way they operate within the institutional environment.

4.5.3 GOVERNANCE STRUCTURES (LEVEL 3)

The third level within the new institutional economics framework is concerned with the governance structures. Governance structures refer to the way the transactions between the farmers and their buyers are organised (Williamson, 2000). The farmers from Eksteenskuil currently can employ two types of governance structures when they market their raisins. The first type is the spot market, where farmers can sell their raisins to any of the processing companies in the region. Importantly, farmers who use the spot market as governance structure may act autonomously on market signals. The other type is a hybrid mode of governance where farmers can enter into a contractual relationship with the raisin processing company (SAD) that buys their raisins. The contract that is currently available to the farmers relates to the specifications type of contracting relationship as described by Peterson *et al*. (2001).

All of the farmers from Eksteenskuil, however, do use the specifications contract when marketing their raisins in order to get access to the fair-trade initiative. Although it is recognised that governance structures have to be assessed comparatively (Milagrosa, 2007),

the case of Eksteenskuil does not lend itself to such a comparison. Since all farmers use the same type of governance structure, the aim of this section is to identify the type of governance structure that will minimise the transaction cost faced by the participants in the transaction. First, the transaction is assessed in terms of the specific attributes of the transaction, followed by the application of two different frameworks to identify the best type of governance structure based on the attributes of the transaction. The framework of Mahoney (1992) is used to get an idea of the intensity of coordination control that is needed given the attributes of the transaction. Thereafter the decision making framework developed by Peterson *et al*. (2001) is used to assess whether or not there is a need for changing the current governance structure. Although it is recognised that a firm needs to make this strategic decision for every vertical (forward and backward) exchange relationship that it must execute in the process of doing business (Peterson and Wysocki, 1997), the focus of this particular analysis is on the transaction between the Eksteenskuil farmers and their buyer (SAD).

4.5.3.1 Attributes of the transaction between farmers from Eksteenskuil and SAD

The optimal choice of governance structure is influenced, amongst others, by the transaction cost associated with the transaction (Hobbs, 1996). The attributes of the transaction that affect the level of transaction cost within a transaction include the levels of asset specificity, the uncertainty within the transaction and the frequency of transactions (Milagrosa, 2007).

- Asset specificity

For the purpose of assessing the level of **physical asset specificity** associated with the production of raisins, the different aspects considered include farmers' investment in a vehicle specifically for the production or transporting of raisins, drying infrastructure, storage facilities, and package material. At first glance there is evidence that the farmers from Eksteenskuil are well invested into physical assets that are specific to the production and marketing of raisins. About 50% of the farmers indicated that they have a vehicle that they use specifically to deliver their raisins to SAD. All of the respondents have laid cement slabs that are used for sun drying raisins (Thompson's Seedless), while about 23% of them indicated that they have also invested in drying trays (drying infrastructure) that are used to dry the golden raisins. Some farmers (about 12%) have also invested in storage facilities where they can store their raisins prior to delivering it to SAD. However, the level of physical asset specificity actually refers to the investment in physical assets that are specific to the transaction under consideration. The vehicles also can be used to deliver raisins to other buyers, and also for other purposes on the farms. Similarly, the raisins that are dried on the cement slabs and/or on the trays can also be sold to other processing companies. Lastly, the storage facilities can also be used to store other products and raisins that are sold to other buyers. Since the assets can also be used for other transactions and/or purposes, the opportunity cost for those assets is high. The high opportunity cost of the physical assets implies that the levels of physical asset specificity for

the farmers from Eksteenskuil who sell their raisins to SAD via the fair-trade initiative is in fact low.

When assessing the levels of **physical asset specificity** for the raisin processing company (SAD) that buys the raisins from the farmers from Eksteenskuil, it is evident that SAD does have some highly sophisticated machines that perform the washing, sorting and packing of raisins. SAD also uses sophisticated machinery to remove foreign objects from the raisins. Those machines are used exclusively for the processing of raisins. The requirement of such specific assets to process and pack raisins may suggest that raisin processing is associated with high levels of physical asset specificity. However, the level of physical asset specificity relates only to the transaction between the farmers from Eksteenskuil and SAD. SAD uses those same machines for the processing of raisins produced by non-members of EAC. The opportunity cost of the machinery is thus still high, which implies a low level of physical asset specificity. Overall, both the farmers and SAD face low levels of physical asset specificity in transactions with each other.

The level of formal education may be used as a proxy for the degree of **human asset specificity** (Milagrosa, 2007). The higher the level of formal education of the participant in the transaction, the higher the level of human asset specificity is accepted to be. The average number of years of formal education of the respondents from Eksteenskuil is 8.88 years. Given that a person who has completed Grade 12 has completed 12 years of formal education, the average of 8.88 years means that most respondents have not completed grade 12. The relatively low levels of formal education of the farmers suggest that the level of human asset specificity associated with the production of raisins is not necessarily that high.

The level of **temporal asset specificity** is also relatively low. When assessing the level of temporal asset specificity, one is concerned with the level to which the value of the product is constrained by time (Milagrosa, 2007). The value of raisins is not directly influenced by time. Dried raisins can be stored for a considerable period of time with no influence on the value of the raisins. Similarly, the value of the raisins at the processing company is not constrained by time. The processing company normally receives all the raisins between February and April, and then they process them upon order throughout the remainder of the year. If the conditions in which the raisins are stored are acceptable, the quality (and hence the value) of the raisins is not negatively affected over a reasonable period of time. The production and processing of raisins thus face relatively low levels of temporal asset specificity.

Transactions between the Eksteenskuil raisin producers and their buyer do exhibit moderate **site specificity**. The raisin producers invest in the production of grapes on their farms, but they also live on their farms. Similarly, the raisin processing company also owns the processing plant that is located in the major raisin production area along the Orange River.

Their investment in this infrastructure represents sunk costs because it is difficult to transfer the plant once it is erected.

Both the farmers from Eksteenskuil and their buyer also exhibit moderate to high levels of **dedicated assets**. Dedicated assets suggest that once the asset is being used for one purpose it cannot be used for another purpose. Since grapes are perennial crops, using land to produce grapes for raisins means that the land cannot be used for any other purposes for a considerable period of time. The economic lifespan of sultana grapevines is about 25 years (Laubscher, 2009). Similarly, the processing plant is of such nature that it is only be used to process and pack raisins. Some parts of the plant (i.e. storage facilities), however, can also be used for other purposes. The level of dedicated assets thus may be lower for the processing plant than is the case for the production of raisins.

Based on the aspects considered as proxies for the levels of physical asset specificity one may conclude that transactions between the raisin producers from Eksteenskuil and their buyer exhibit only moderate levels of physical asset specificity. Next the focus shifts to the levels of uncertainty associated with the transaction as a cause for transaction cost.

- Transaction uncertainty

Transactions between the Eksteenskuil raisin producers and their buyer also contain a moderate level of transaction uncertainty. Transaction uncertainty is divided into endogenous and exogenous uncertainty. Endogenous uncertainty is centred around uncertainty with regard to the possibility of receiving delayed payment, and the fact that trading partners may withhold important transaction specific information from each other. On the other hand, exogenous uncertainty is concerned with changes in the demand for the product, consumer preferences (Milagrosa, 2007; Verhaegen and Van Huylenbroeck, 2002:23) and the ability of the farmers to produce the demanded volumes of the products.

When considering delayed payments as a source of uncertainty to the farmers, the processing company has a payment system whereby the farmers get paid for their raisins by the first Friday after the raisins were delivered for raisins delivered before Thursday, and by the next Friday for raisins that were delivered on Thursday or Friday. Despite the payment system about 19% of the respondents indicated that they had received delayed payments during the past year. In addition to the number of farmers who had received delayed payments, about 31% of the respondents also feel that the buyers are withholding important transaction specific information from them. The number of farmers who had received delayed payments and who feel that the buyer withhold important information suggest that the farmers do face moderate levels of endogenous uncertainty.

With regard to changes in demand and consumer preferences, the farmers from Eksteenskuil experience a moderate level of exogenous uncertainty. Since 2009, Traidcraft has stopped buying golden raisins from Eksteenskuil, mainly due to the global financial crisis (Kok, 2009). Moreover, while the farmers from Eksteenskuil were the sole suppliers of fair-trade raisins in the world prior to 2010 (Koch, 2010; Kok, 2010), raisin producers from Chile and India also obtained FLO accreditation in 2010 to export raisins via the fair-trade initiative. Since both Chile and India are able to meet all of the demand for fair-trade raisins in the world, the farmers from Eksteenskuil face some serious uncertainty with regard to the demand for their raisins.

In addition to the uncertainty in the demand for their raisins, the farmers from Eksteenskuil also face some uncertainty with regard to their ability to produce a large volume of good quality raisins that meet the requirements to be exported via the fair-trade initiative. The harvesting season for the grapes corresponds to the raining season in the Northern Cape. The fact that Thompson's Seedless raisins are sun dried implies that the longer the time they take to dry, the higher the risk of being rained upon. Rain during the time period while the raisins are lying in the sun negatively affects the quality of the raisins. The uncertainty in the ability of the farmers to deliver good quality raisins also serve as exogenous uncertainty for the fair-trade buyer.

Another source of exogenous uncertainty for the fair-trade affiliated buyer is that the farmers will sell their raisins to other processing companies. The processing capacity along the Orange River currently is about double the production capacity (Laubscher, 2009). Consequently there is strong competition for raisins among the five processing companies. Since the processing companies mainly compete in terms of prices, the different companies tend to contact farmers and offer them better prices for the raisins. Since the Eksteenskuil farmers only receive the additional payment (from the fair-trade price) after the raisins are exported (around October each year), the timeliness associated with the marginally higher price when selling the raisins to a different processing company is a strong incentive for the farmers rather to sell to the other companies.

Based on the different types of uncertainty faced by the farmers and their buyer it is evident that the overall level of uncertainty associated with the transaction is high (from both sides). Next, the focus shifts to the frequency of transactions as a cause for transaction cost.

- Transaction frequency

Transaction frequency refers to the number of transactions between the farmers and the specific buyer (i.e. SAD in this case). Hai (2003) argues that the higher the frequency of the transactions it becomes worthwhile to employ a more expensive governance structure (i.e. a governance structure with higher intensity of coordination control). The farmers from

Eksteenskuil indicated that, on average, they deliver about 4.5 loads of raisins to the buyer spread over the harvesting season. Although the transaction frequency thus proves to be relatively low, with each load the farmer has the opportunity to take the raisins to a different processing company.

- Search and information cost

Another type of transaction cost faced by the raisin producers from Eksteenskuil relates to the costs incurred by searching for information and for a transacting partner. Interestingly the average number of buyers the respondents indicated to have contacted before deciding on which company to sell the raisins to, is 1.54. Keeping in mind that the farmers actually are contracted to sell their raisins to SAD, it is evident that the farmers are shopping around before complying with the contract. The fact that the farmers are contacting other buyers provides more evidence of the exogenous uncertainty faced by their buyer in terms of the farmers selling all of their raisins to SAD.

The low levels of formal education highlighted under human asset specificity may contribute to higher information cost for the farmers. The farmers with lower levels of formal education may not have the necessary skills to search for strategic market information. Although searching for market information is the responsibility of the farmers themselves, SAD does provide market information to the farmers. Market information on international supply and demand is published in the Foodnews magazine. The magazine is subscription based with relatively high subscription fees. Again the limited amount of direct access to international market information (i.e. through the Foodnews magazine) contributes to the perception of opportunistic behaviour by the buyer.

Considered from the buyer's perspective, it is evident that the search and monitoring costs are high when transacting with a large number of small producers. The median yield for Thompson's Seedless produced by Eksteenskuil raisin producers is only 3.04 ton which suggests that the marginal benefit per farmer is not that high for SAD. Moreover, the monitoring cost to ensure that the farmers are selling all of their raisins to SAD is also high when dealing with the large number of small-scale farmers. Again the high levels of search, information, and monitoring cost from the buyer's perspective suggest the need for a more coordinated approach to the transaction.

- Negotiation cost

The low levels of formal education of the farmers from Eksteenskuil may also contribute to higher negotiation cost for them since they only have a limited capacity to negotiate for better terms of trade with a big company such as SAD. The respondents indicated that on average they take about 1.15 hours to negotiate the price. However, when asked the level to which they think they are able to influence the price, the average score for the respondents was two

on a five point Likert scale (when they have no influence at all they scored one, and five if they have total control over the price). Thus, although the farmers are negotiating for better prices, the level to which they feel they are able to actually influence the price proves to be limited. The respondents from Eksteenskuil thus do face high negotiation cost. The higher the negotiation cost the higher is the transaction cost faced by the farmers who participate in the transaction.

From the above discussions it is evident that the raisin producers from Eksteenskuil do face relatively high levels of transaction cost, and hence are also exposed to one of the major barriers to entry that was identified in the literature to effectively exclude emerging farmers from participating in commercial agri-food chains. Although the levels of physical, human and temporal asset specificity are relatively low, the farmers do face high levels of uncertainty (both endogenous and exogenous), search and information cost, and negotiation cost. The high levels of transaction cost suggest that the raisin producers from Eksteenskuil do require a governance structure that may contribute to reducing the transaction cost they face. Within the next section the aim is to match the characteristics of the transaction to a specific type of governance structure that will minimise the transaction cost faced by the raisin producers from Eksteenskuil.

4.5.3.2 Matching the transaction with the optimal type of governance structure for Eksteenskuil raisin producers

Mahoney (1992) developed a framework to guide the choice of vertical coordination strategy (governance structure) based on the attributes of the transaction. Based on the framework of Mahoney (1992) there are three conditions that have to be considered when deciding on a coordination strategy, namely separability, asset specificity, and task programmability. Separability refers to the ability to determine and measure the value of the contribution of each of the parties, and hence the reward for each participant in the transaction. Asset specificity refers to the level to which the assets are specific to the transaction under consideration. Lastly, task programmability refers to the degree of uncertainty within the transaction.

When assessing the transaction between raisin producers from Eksteenskuil and SAD in terms of the three conditions one may argue that there are two different points of view with respect to the level of separability (complementarity). Firstly, one may argue that there is a high degree of **separability**. It is possible to distinguish between the contributions of the farmers and the processing company within the value chain hence both parties can be rewarded accordingly. The farmers produce the raisins, sell it to the processing company and get paid (rewarded) market related prices for the raisins. Similarly, the processing company grade, clean and package the raisins before selling it further downstream. Again the processing company is rewarded through the market related price it earns when selling the raisins downstream.

On the other hand, the nature of the transaction through the fair-trade initiative implies that the benefit of the combination of the activities by the raisin producers and SAD is greater than the sum of the benefits that could have been generated if the two groups of participants worked individually. In order to export raisins via the fair-trade initiative both the farmers and the processing company have to be FLO accredited. Neither party can participate in the fair-trade initiative on its own. From this point of view one may argue that the transaction exhibits a high degree of non-separability. Since one of the prerequisites for exporting raisins via the fair-trade initiative is that both parties have to be FLO-accredited, the conclusion is made that the transaction between raisin producers from Eksteenskuil and SAD actually exhibits a high degree of non-separability.

The transaction between the raisin producers from Eksteenskuil and their buyer exhibits a low degree of **task programmability** (or a high degree of uncertainty). Given that the production of grapes is a biological process the relative volumes and quality of raisins are influenced by a variety of external factors, such as environmental conditions over which the farmers have no control. Thus, although the farmers may apply the recommended levels of production inputs, they cannot be certain what yield and quality they will generate. The uncertainty in the production volumes of good quality raisins that can be exported via the fair-trade initiative also implies that the processing of the raisins for the fair-trade market exhibits low levels of programmability.

As discussed above, another source of uncertainty for the farmers from Eksteenskuil and SAD relate to the changes in demand for fair-trade raisins. While the total demand for fair-trade raisins proves to remain stable, the introduction of newly FLO-accredited producers means that the market has to be shared. Given the high transaction cost faced by the fair-trade affiliated company when dealing with the farmers from Eksteenskuil, there is a definite risk that the buyer may discontinue procuring raisins from Eksteenskuil. Similarly, the processing company and the fair-trade buyer face the uncertainty in whether or not the farmers will market all of their raisins via the fair-trade channel. Evidently there are high levels of uncertainty within the transaction, and consequently relatively low degree of task programmability in the transaction.

Of the three conditions that have to be considered, the level of **asset specificity** is least of a concern. The farmers from Eksteenskuil are not invested heavily in physical assets that are specific to the production and marketing of raisins mainly due to the very nature of being an emerging farmer. Moreover, none of the assets within which the farmers have invested are specific only to the transaction under consideration. Farmers who do not participate in the transaction via the fair-trade initiative can still produce and sell their raisins via the ordinary export market. The opportunity cost of the assets is thus high. The raisin processing company, on the other hand, have invested in physical assets that are specific to the processing of raisins. Again the processing company can (and do) use the assets in transactions other than the

transaction under consideration, hence the opportunity cost of the assets is high. The fact that the opportunity cost of the assets is high suggests that the level of physical asset specificity is relatively low.

Other forms of asset specificity (i.e. temporal and site specificity and dedicated assets) are relatively high for the production and processing of raisins, however, it is not specific to the transaction between raisin producers from Eksteenskuil and SAD. One thus may conclude that the transaction between raisin producers from Eksteenskuil and SAD does not exhibit high levels of asset specificity.

When considering the transaction in terms all three conditions from the Mahoney framework it is evident that the transaction is associated with a low degree of programmability, a low degree of asset specificity, and a higher degree of non-separability. Given the three attributes of the transaction the Mahoney framework suggests a strategic alliance to be the appropriate level of vertical coordination (Mahoney, 1992). A strategic alliance as a governance structure is grouped within the hybrid mode of governance as identified by Williamson (1985). Interestingly, when speaking to the farmers from Eksteenskuil they do view SAD as their strategic partner. Note, however, that the relationship is not a formal strategic alliance. Compared to the current governance structure (specifications contracting) a strategic alliance lies further to the right on the vertical coordination continuum.

Based on the findings when applying the Mahoney framework to the case of Eksteenskuil, there is evidence that there is a need for a higher degree of vertical coordination. The decision making framework of Peterson *et al*. (2001) is used next to qualitatively investigate whether or not there is a need for more vertical coordination towards a strategic alliance.

4.5.3.3 Is there a need to change the current governance structure used by Eksteenskuil raisin producers?

According to the decision making framework, a firm will only change its current coordination strategy if it answers yes to all of the following five questions.

Question 1 – Is the current marketing system too costly?

A firm may decide to change the current coordination strategy if costly coordination errors are present (Peterson *et al*., 2001). An existing strategy may be considered to be too costly if coordination errors regularly expose the firm to the opportunism of trading partners or result in chronic over or under production versus demand, or if the existing strategy is more costly to execute than the coordination errors it is designed to control (Peterson *et al*., 2001).

In the case of raisin production and marketing at Eksteenskuil, there may be a mismatch that contributes to the costliness of coordination errors. The farmers do feel that SAD withholds important market related information from them which allows the buyer to act opportunistically at the expense of the farmers. The farmers consequently are more open to negotiating with other processing companies who are willing to offer higher prices than SAD. From the buyer's side, the costliness of coordination errors may be even higher. Over the past five years, there has been a chronic under production versus demand. While the demand for choice grade Thompson's Seedless raisins via the fair-trade initiative is about 900 tonnes per annum (Kok, 2008), the total volume of Thompson's Seedless raisins delivered by Eksteenskuil farmers decreased substantially from about 600 tonnes in 2007, to only 220 tonnes in 2011. In none of the years since 2007 the total yield was more than one half of the 900 tonnes demanded. The export price via fair-trade is R2 496 per tonne higher than the ordinary export price for Thompson's Seedless raisins (R26 624/ton vs. R24 128/ton). The failure to produce the total volume of raisins demanded through fair-trade during 2011 implies that a total value of R1 697 280 (680 tonnes multiplied by the difference in export price of R2 469/tonne) is foregone. The coordination errors in the case of Eksteenskuil evidently are more costly than the cost of coordination by means of specifications contracting.

With regard to the contractual relationship between Eksteenskuil raisin producers, SAD and Traidcraft, there is a high level of complementarity (non-separability). Neither Eksteenskuil raisin producers, nor SAD can benefit from marketing raisins through the fair-trade initiative without the contribution of the other party. Eksteenskuil does not have the processing and exporting capacity that is required by the fair-trade initiative, while SAD does not meet the fair-trade requirements to be a fair-trade producer of raisins. The combined benefit from Eksteenskuil and SAD thus outweighs the sum of the individual benefits. The high level of complementarity contributes to the costliness of coordination errors (Wysocki, Peterson, and Harsh, 2003) along the raisin value chain and serves as an incentive for more intense control.

The presence of costly coordination errors initiates the change process (Peterson *et al*., 2001) and leads to the consideration of the second question.

Question 2 – Would an alternative strategy reduce the "costliness" of the marketing system?

In essence the second question is concerned with whether or not another vertical coordination strategy would contribute to a better match between the intensity of control with the costliness of coordination errors for the transaction under consideration (Wysocki *et al*., 2003; Jordaan and Kirsten, 2008).

The high level of complementarity (non-separability) and mixed levels of asset specificity that characterise the transaction between raisin producers and SAD imply that the cost of

coordination errors may be higher than the cost of organising the contracting relationship between the farmers and SAD. According to Wysocki *et al*. (2003), such a situation requires a greater intensity of control through a higher level of vertical coordination (moving to the right along the vertical coordination continuum (Jordaan and Kirsten, 2008)).

The key characteristics of a relation-based alliance within the vertical coordination continuum are mutuality in identifying objectives, controlling the decision-making process, and also sharing in risks and benefits (Martin *et al*., 1993, as cited by Peterson *et al*., 2001). Mutuality in coordination control is thus the main characteristic of a relation-based alliance (Peterson *et al*., 2001). Given the high level of non-separability and mixed levels of asset specificity, a relation-based strategic alliance that is built on mutual control may be a better match between the costliness of coordination errors and the intensity of coordination control. The answer to the second question is thus "Yes". Given the positive answer to the second question one may move to the third question, which is concerned with the level of programmability of the recommended vertical coordination strategy.

Question 3 – Is an alternative programmable?

With the third question, the decision maker has to determine whether or not effective, specific management routines exist for making the potential strategy workable (Wysocki *et al*., 2003). When considering the farmers from Eksteenskuil individually, one may argue that, for the majority of farmers, effective, specific management routines do not exist. The low levels of human capital (i.e. formal education) amongst the farmers negatively affect the ability of the farmers to manage transactions under higher degrees of intensity of control. On an individual basis, the relation-based strategic alliance thus will be considered not to be programmable.

In the case of Eksteenskuil, however, one has to take cognisance of the important role played by the management of EAC in the operations of raisin producers from Eksteenskuil. Currently the management of EAC negotiates the terms and conditions of the specifications contracts on behalf of the farmers. The contracts between the individual farmers and SAD are standardised for all farmers from Eksteenskuil. A similar service can also be performed by the management of EAC in the case of a relation-based alliance between the farmers and SAD. Within such a scenario one may argue that the relation-based alliance as vertical coordination strategy may be considered to be programmable, implying a "Yes" in answer to Question 3.

Given that the answer to Question 3 is "Yes", one should continue to the fourth question to determine whether or not the alternative is implementable.

Question 4 – Is an alternative implementable?

At this stage it is evident that a higher degree of vertical coordination (i.e. a relation-based strategic alliance) may be programmable and will reduce coordination errors. Question 4 is

concerned with whether or not the relation-based alliance is implementable in the case of Eksteenskuil and SAD.

Peterson *et al*. (2001) list four conditions that determine whether or not an alternative strategy would be implementable: there should be sufficient capital available to implement the new strategy; there have to be compatible partners with whom to enter into the new relationship; the parties have to exhibit the required competence to control the new coordination strategy; and the arrangement has to be legal (institutionally acceptable).

The establishment of a relation-based strategic alliance between the farmers from Eksteenskuil and SAD requires only a limited amount of additional capital for the farmers and SAD. The farmers are already organised as a registered agricultural co-operative (EAC) and have the necessary facilities to produce the raisins. SAD already has a processing plant with state of the art technology that is required to process the raisins to meet the stringent requirements of the fair-trade buyer. Additional capital is mainly required for the legal fees to formalise the relation-based strategic alliance. The legal fees, however, will not be substantial amounts.

With SAD the farmers from Eksteenskuil do have a compatible partner that can enter into the relation-based alliance. The degree to which SAD and the farmers from Eksteenskuil are compatible, however, depends on the strategic direction of their businesses. According to Koch (2009), SAD does view their relationship with the farmers from Eksteenskuil as part of their corporate social responsibility, and SAD also benefits monetarily from exporting the raisins via the fair-trade initiative. The strategic direction of the business of SAD thus does include a relationship with the raisin producers from Eksteenskuil. From the farmers' perspective, they already consider SAD to be their strategic partner (although it is not formalised). The degree of compatibility between the farmers and SAD thus prove to be sufficient for the purpose of establishing a relation-based strategic alliance.

Although the farmers from Eksteenskuil individually do not necessarily exhibit the required competence of control, the management of EAC does have the required competence to control the relation-based alliance with SAD. If the farmers are willing to work collectively and to allow the management of EAC to control the relationship on their behalf (as they are currently doing), one may conclude that they do have the required competence of control to participate in the relation-based alliance as a vertically coordinated strategy.

Lastly, there is no law, nor any other rules and regulations that prohibit the formation of a relation-based strategic alliance between the farmers from Eksteenskuil and SAD. The alternative strategy (relation-based strategic alliance) thus can be considered to be institutionally acceptable. The case of Eksteenskuil thus does meet the four conditions for the strategy to be considered implementable, hence the answer to Question 4 is also "Yes". Before

changing from the current strategy to a relation-based strategic alliance one has to assess whether or not the risk return trade-off is acceptable.

Question 5 – Is the risk/return trade-off acceptable?

Based on the discussions under Question 1 through Question 4, it is evident that the reduction in coordination errors will have a substantial increase in the value that can be extracted by the farmers from Eksteenskuil. The return associated with changing from the current specifications contracting relationship to a relation-based strategic alliance with SAD is thus substantial and sufficient to compensate for the increase in risk they face.

Since the answers to all five questions are "yes" for the case of Eksteenskuil, one may conclude that the farmers from Eksteenskuil and SAD should change their current coordination strategy to a relation-based alliance. The relation-based alliance is associated with higher intensity of control that will contribute to reducing the costliness of coordination errors (Peterson *et al*., 2001). The application of the framework of Peterson *et al*. (2001) thus confirms the outcome when applying the framework by Mahoney (1992). A comprehensive assessment is necessary to determine the conditions for the relation-based relationship that will maximise the benefits to the farmers, and also for SAD. The case of Eksteenskuil thus shows that the farmers do benefit from having identifying a partner in agro-processing as recommended by NDP (2011) and they would benefit even more if the relationship was to be formalised as a strategic partnership as recommended by CRDP (2010)

The conclusion that a more vertically coordinated strategy will benefit the farmers from Eksteenskuil and SAD concludes that analysis of the governance structures within the third level of the NIE framework. The fourth level of the NIE framework by Williamson is concerned with resource allocation. More specifically, Level 4 is concerned with the way resources are allocated given the way the farmers from Eksteenskuil "play the game" (Level 3) within the institutional environment (Level 2) and their levels of social embeddedness (Level 1). The analysis of Level 4 follows next.

4.5.4 RESOURCE ALLOCATION (LEVEL 4)

The fourth level of the NIE framework is concerned with the allocation of resources given the way economic agents behave within the institutional environment given their levels of social embeddedness. For the purpose of analysis, a distinction is made between the production sub-decision making unit (DMU) and the marketing sub-decision making unit (DMU) (Figure 4.9).

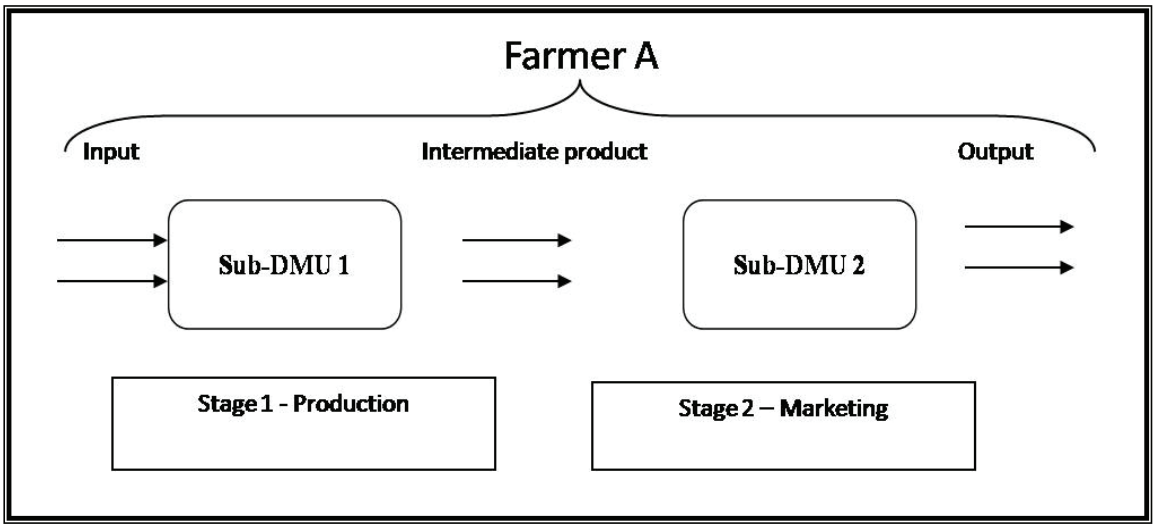

Figure 4. 9: Schematic representation of the division of a farmer decisions making unit (DMU) into a production sub-decision making and a marketing sub-decision making unit.

When investigating the resources allocation within the production sub-DMU, the focus is on the level to which farmers are able to generate the maximum amount of output from the current levels of inputs that they are using (technical efficiency), and the level to which they are able to choose that combination of inputs to produce the output at minimum cost (allocative efficiency). The level of economic efficiency of the production sub-DMU is the product of the levels of technical and allocative efficiency within the production sub-DMU.

After quantifying the levels of economic efficiency of the production sub-DMUs, the focus shifts to the level of efficiency within the marketing sub-DMU. The aim of the marketing sub-DMU is to convert the produced product into the maximum amount of revenue. A farmer is considered to be marketing efficient if he has generated the highest possible income from the given produce. After the level of marketing efficiency has been calculated, the last aspect of importance when assessing the fourth level is to quantify the level of overall efficiency of the farmers. The overall efficiency is the product of the level of technical efficiency of the production sub-DMU and the level of marketing efficiency of the marketing sub-DMU.

By dividing the farming unit into a production and marketing sub-decision making unit for the purpose of analysing the resource allocation of the farmers, one is able to identify what component of the core business of the farmer (production or marketing) requires priority attention to improve the overall performance of the farmers from Eksteenskuil.

4.5.4.1 Technical efficiency analysis of raisin producers from Eksteenskuil

The analysis of the technical efficiency of the raisin producers consists of two sections. Firstly, the technical efficiency scores for the respondents are calculated to get an understanding of the degree to which they use their available production inputs to produce optimal levels of raisins. Secondly, the analysis contains a section where the factors that affect the levels of technical efficiency with which the farmers use their inputs are explored.

4.5.4.1.1 Technical efficiency analysis of raisin producers from Eksteenskuil

The farmers from Eksteenskuil were benchmarked against each other on the probability of achieving a certain level of efficiency. The technical efficiency scores were also calculated for a group of commercial raisin producers in the region to get an idea of the comparison between technical efficiency levels of emerging and commercial raisin producers within the same area. Figure 4.10 shows the cumulative probability distributions of the technical efficiency scores of the small-scale farmers from Eksteenskuil (dotted line) and large-scale commercial farmers (solid line). The x-axis represents the technical efficiency scores, while the y-axis represents the cumulative probability of achieving a specific efficiency score.

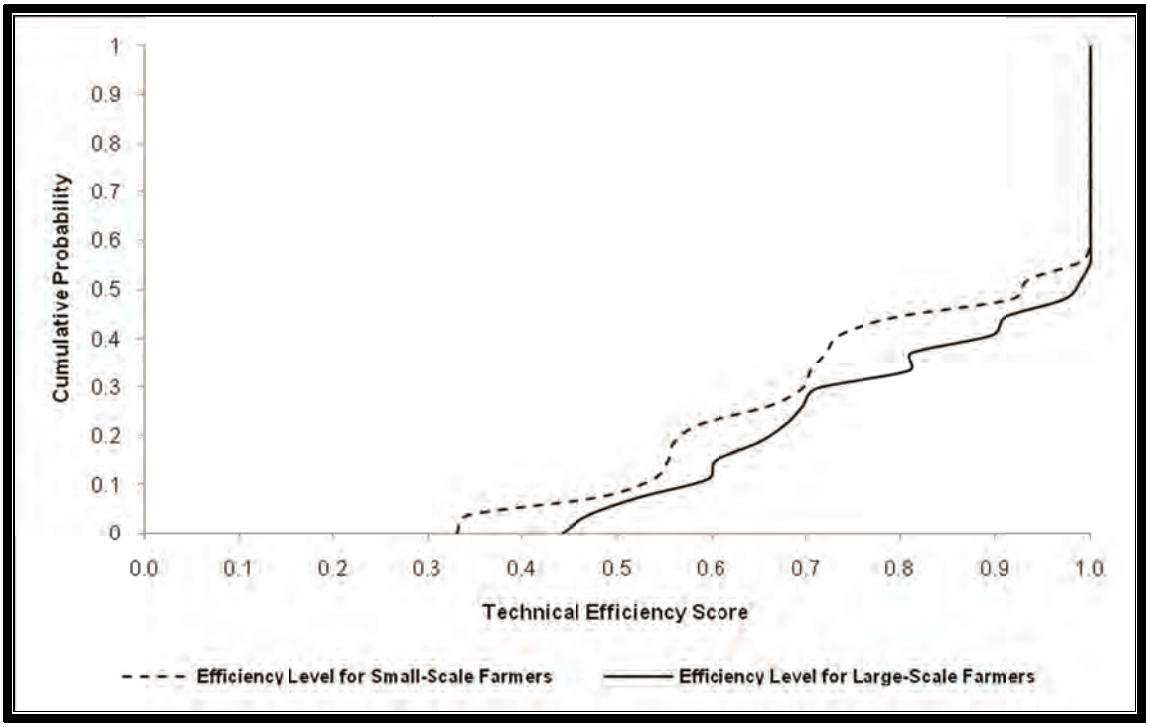

Figure 4. 10: Cumulative probability distribution of technical efficiency scores of small-scale raisin producers from Eksteenskuil and large scale commercial raisin producers in the region.

Figure 4.10 shows that approximately 60% of the respondents from Eksteenskuil are considered to be inefficient since they achieved a technical efficiency score of less than one. Thus, only 40% of DMUs are regarded as technically efficient in raisin production. The lowest technical efficiency score is about 0.33 which implies that the worst performing farmer could have increased his yield by 67% at the current input levels in order to produce at the frontier. About 20% of decision makers attained a technical efficiency score below 0.6, suggesting that those respondents could have increased their output with more 40% at the current input levels. About 10% of decision makers scored technical efficiency scores between 0.6 and 0.7, while another 20% scored between 0.7 and 0.9. Importantly, the distribution of technical efficiency scores shown in Figure 4.10 suggests that 60% of the respondents could have produced higher volumes of raisins at their current input levels and technology set. The DEA procedure identifies peers for each DMU that is included in the analysis. The 40% of farmers who are considered to be technically efficient may act as peers to other respondents who do not use their inputs efficiently. The practices of the peers could be used as a point of reference for inefficient raisin producers to improve their production in order to also produce on the frontier.

The solid line in Figure 4.10 represents the cumulative probability distribution of the technical efficiency scores of commercial raisin producers. The results reveal that approximately 55% of DMUs are inefficient while approximately 45% of DMUs are observed to be technically efficient in raisin production. Interestingly, the distribution for commercial farmers thus does not differ that much from the distribution for the farmers from Eksteenskuil. The lowest technical efficiency score for the commercial farmers is just above 0.45, compared to the 0.33 of the farmer from Eksteenskuil. The tail of the distribution of technical efficiency scores for the commercial farmers is marginally steeper compared to that of the farmers from Eksteenskuil.

Note, however, that the commercial farmers were benchmarked only to other commercial farmers in the region. The efficiency scores of the two groups of farmers presented in Figure 4.10 cannot really be compared. In order to allow for a more accurate comparison between the technical efficiency levels of raisins producers from Eksteenskuil and commercial raisin producers in the region, both groups of farmers have to be included in the same analysis to allow the groups of farmers also to be benchmarked with each other. Within the next section technical efficiency scores of the two groups of farmers who are benchmarked to each other are presented and discussed.

4.5.4.1.2 Comparison of technical efficiency scores of raisin producers from Eksteenskuil and commercial raisin producers

In this section, the technical efficiency scores for the two groups of farmers were calculated by benchmarking all of the farmers with each other. The technical efficiency scores of the farmers from the different groups consequently can be compared to get an accurate understanding of

the comparison between the technical efficiency scores of raisin producers from Eksteenskuil and commercial raisin producers. The cumulative probability distributions of the technical efficiency scores are shown in Figure 4.11.

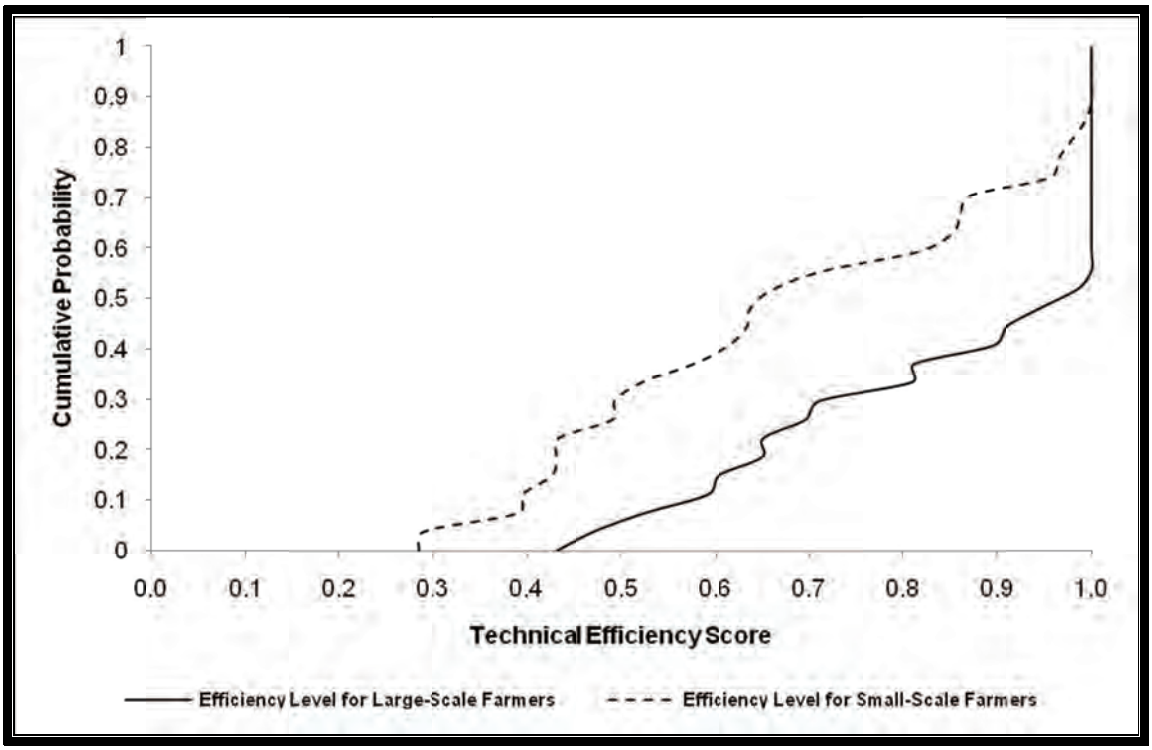

Figure 4. 11: Cumulative probability distribution of technical efficiency scores of small-scale raisin producers from Eksteenskuil and large scale commercial raisin producers in the region when benchmarked to each other.

Interestingly, from Figure 4.11, there are three farmers from Eksteenskuil who are producing on the efficiency frontier even when benchmarked to commercial farmers in the region. Such a finding suggests that there are farmers from Eksteenskuil who do perform relatively well, even when compared to commercial raisin producers. The distribution of the technical efficiency scores of the commercial farmers shown in Figure 4.11 is very similar to the distribution of their efficiency scores when the commercial farmers are only benchmarked to each other (Figure 4.10). As expected, the results suggest that the farmers from Eksteenskuil do not really influence the performance of the commercial farmers. On the other hand, the distribution of the efficiency score of the farmers from Eksteenskuil moved to the left when benchmarked with commercial farmers in the region. A movement to the left implies an increase in the probability to obtain a specific technical efficiency score or less. For example, when the farmers from Eksteenskuil were benchmarked only to each other, the probability of obtaining a technical efficiency score of 0.6 was about 20%. However, when benchmarking the Eksteenskuil farmers also to commercial farmers in the region, the probability of obtaining an efficiency score of 0.6 increased substantially to about 40%. When also being compared to commercial

farmers, the performance (in terms of technical efficiency) of the farmers from Eksteenskuil is even worse. The lowest technical efficiency score decreased to about 0.27 (from 0.33) which suggest that the farmer could have increased his yield with about 73% at the same input level if he was to produce on the efficiency frontier. The results thus suggest that the farmers from Eksteenskuil may benefit from observing the production practices of commercial farmers in the region.

Another interesting occurrence that is visible in Figure 4.11 when considering the distributions of the technical efficiency scores of the two groups of farmers who are considered to be technically inefficient (technical efficiency score is less than one), is that the two distributions are almost parallel to each other. At each of the probabilities, the difference in technical efficiency score between the farmers from Eksteenskuil and commercial farmers is about 0.2. The results thus suggest the presence of an efficiency gap of about 0.2 between the commercial raisin producers and their counterparts from Eksteenskuil. The efficiency gap may be an indication of the difference in the nature of commercial farmers and resource poor farmers in terms of technology and skills.

Regardless whether the raisin producers from Eksteenskuil are benchmarked to each other or also to commercial farmers, the low levels of technical efficiency is a cause for concern. It shows that the farmers should be able to increase their production volumes at their current technology set. Thus, the results of the efficiency analysis for the case of Eksteenskuil confirm that there is scope to improve the production volumes through the optimal allocation of resources as documented in the strategic plan in CRDP (2009). Moreover, the identification of peers by means of the DEA-analysis to calculate technical efficiency scores shows that there is scope for promoting farmer-to-farmer skills transfer in the case of Eksteenskuil as recommended by NDP (2011). Next, regression analysis is used to identify the factors that contribute to higher levels of technical efficiency.

4.5.4.1.3 Factors affecting technical efficiency of raisin producers from Eksteenskuil

The technical efficiency scores of the farmers from Eksteenskuil that were calculated when benchmarking the farmers from Eksteenskuil only to themselves are used as the dependent variable in the regression analysis to identify the factors that affect the level of technical efficiency with which the farmers use their inputs. Given the relatively small sample size, principle component regression is used to increase the degrees of freedom of the analysis. The results of the principle component regression are shown in Table 4.4.

Table 4. 4: Results from principle component regression to identify factors affecting technical efficiency of raisin producers from Eksteenskuil.

	Coefficient (β)	Standard Error	T-ratio	Probabilities
Farmers_age	0.004	0.001	3.356	0.015**
Formal_educ	0.009	0.002	5.022	0.002***
Farming_exp	0.007	0.001	4.907	0.003***
off_farm_act	-0.001	0.001	-1.920	0.103
Land_tenure	0.183	0.042	4.369	0.005***
Young_vines	-0.156	0.065	-2.415	0.052*
Old_vines	-0.235	0.073	-3.245	0.018***
Formal_credit	0.161	0.025	6.583	0.001***
Informal_credit	0.023	0.043	0.525	0.618
Labour_health	0.011	0.011	1.002	0.355
Record_keeping	0.025	0.008	2.985	0.024**
Fam_labour	-0.256	0.064	-3.997	0.007***
Timely_suff_irrig	0.003	0.006	0.575	0.586
Remove_weeds	0.006	0.006	0.895	0.405
Timely_pruning	0.028	0.006	4.807	0.003***
Prevent_soil_comp	0.008	0.008	1.045	0.336
Prune_team	-0.007	0.005	-1.420	0.205
Entrepreneurscore	0.003	0.001	2.922	0.027**
DMIsland	0.127	0.055	2.327	0.059*
SCI	-0.003	0.001	-2.158	0.074*
Area	0.038	0.007	5.518	0.001***

Note: ***, **, and * represent significance at 1%, 5% and 10% respectively.

The first three variables in Table 4.4 positively influence technical efficiency at production level. The variables are farmers' age (*Farmers_age*), formal education (*Formal_educ*) and farming experience (*Farming_exp*), which are significant at 5%, 1%, and 1% respectively. All the variables can be grouped together as they have a similar influence on technical efficiency. According to Conradie *et al*. (2006), age and education commonly give unusual results. In their study both age and education were found to reduce technical efficiency. However, in this study the variables were discovered to be highly significant.

Formal education is identified as having an impact on technical efficiency of production and the conclusion follows the results observed from studies conducted by Ogunyinka and Ajibefun (2003), Dolisca and Jolly (2008) and Begum *et al*. (2009). These researchers highlight that illiterate farmers tend to be inefficient compared to farmers with many years of formal education. Formal education as a managerial input means that a farmer with more years of formal education would be expected to make sound management decisions. The positive relationship between formal education and the level of technical efficiency proves that there may be merit in the recommendation by NDP (2011) to use money from the National Skills Fund to support adult

basic education and training. With regard to farming experience, the results obtained are in accordance with a technical efficiency study done by Wollni (2007). The researcher concluded that the longer the years of farm experience the better the efficiency of the decision maker. Better technical efficiency attainment is a result of trial and error that has been practised over the years. It is therefore safe to conclude that with longer experience of raisin production, the more likely that the farmer will be technically efficient.

Land tenure (*Land_tenure*) was included in the analysis as a variable that would best explain secondary effects on farm operations that are likely to enhance farm efficiency. Land tenure was also recognised to influence technical efficiency at a 1% significance level. Speelman *et al*. (2007) found that farmers who had secure tenure were likely to be efficient. The results were as expected that farmers with secure tenure tend to be able to source external finance with relative ease and can therefore finance farm operations without delay. In fact, a large number of technical efficiency studies conducted in developing countries consistently identify tenure security to be responsible for slow growth by small-scale farmers. Again, the results from the case of Eksteenskuil show that the recommendation by NDP (2011) to secure land tenure, as well as the commitment by government to increase the pace of tenure reform (CRDP, 2009) have substantial potential to enhance rural development. In order for the plans of government to start contributing towards rural development, government now has to actively endeavour to meet its commitments.

Since the study was done on a perennial crop, the age of the grapevines was taken into account. Young (*Young_vines*) and old vines (*Old_vines*) were used as age proxies. Both young and old vines were identified to negatively influence efficiency and were significant at 10% and 1% respectively. A credible explanation is that young vines (younger than five years) consume tangible and intangible input resources and technical efficiency is seriously affected as inputs are utilised on vines that are not as yet productive. Thus, there is normally an expectation that farms that are heavily involved in the establishment phase may appear to be less efficient (Conradie *et al*., 2006). On the other hand, the vines become less productive as they get older (> 25 years). In addition, farmers that had a large proportion of old vines were also expected to be inefficient. The explanation is that old vines have reached the end of their productive life and need to be replaced. The results thus show that the farmers should aim to have as small as possible part of their land in either of the categories that contains vines younger than five years and/or older than 25 years. Farmers have to develop a replacement strategy that will allow them to produce optimal yields in the long run. Institutional changes (i.e. securing tenure and introducing a more appropriate financing scheme for emerging farmers) that are already included in plans and/or recommendations by government (in NDP (2011) and CRDP (2009)) will allow farmers to implement such a strategy.

Credit is extremely important for small-scale farmers around the world. Generally, farm business like any other business needs cash/credit to maintain itself and small-scale farmers commonly fall short in this respect. Binam *et al*. (2004) identified farmers having access to credit to be performing better because credit allows farm managers to buy inputs timeously and also to finance cash flow transactions at critical times. Though Binam *et al*. (2004) did not specify the form of credit which farmers' access, in this study formal and informal credit were analysed separately. Formal credit (*Formal_credit*) was found to be highly significantly at a 1% significance level and was likely to have a positive influence on productivity. A possible explanation for the positive and high significance level of formal credit is that farmers who have secure land tenure were likely to obtain formal credit. Formal credit assists farmers to fund business activities with available cash at any given moment. Therefore, small-scale farmers are able to remain afloat and are also able to continue to support their families.

Scholars highlight the importance of record keeping for management and planning purposes. Its importance arises from the idea that farm records represent sound management and planning skills. The significance level was 5% and record keeping was recognised to positively influence technical efficiency. In Eksteenskuil, farmers who were identified as keeping records (*Record_keeping*) were as a result likely to be technically efficient. A farmer that keeps his or her financial and other farm activity records is more likely to be efficient because the farmer can easily refer to his or her records for planning and for credit applications. Wollni (2007) also came to the conclusion that record keeping indeed improves farmers' efficiencies and has a positive influence on technical efficiency.

Literature has highlighted family labour (*Fam_labour*) to be important for small-scale farmers. Further, theory also emphasises that the use of family labour has a positive influence on technical efficiency. The argument put forward is that family labour tends to require less supervision and is more encouraged compared to hired labour and as a result should be extra productive and efficient (Masterson, 2007). Family labour size is used by researchers for various aspects in explaining efficiency. Haji (2006) and Masterson (2007) estimated 'the family size variable with an expectation to improve farmers efficiency due to less supervision required. Wollni (2007) on the other hand, estimated the family labour variable with expectation that it has a positive effect on quality of crop. However, all three researchers discovered that family labour in fact reduced technical efficiency, which was a surprise to the researchers as this was the opposite from their expectations.

In this study, size of family labour was quantified as having a negative influence on technical efficiency at a 1% significance level. A plausible explanation for the negative influence is that although the proportion of family labour employed increases, the size of the land does not change, therefore, unnecessary family labour is utilised. The negative impact of family size on technical efficiency is in line with the results obtained by Masterson (2007), Wollni (2007) and

Haji (2006). Both Masterson (2007) and Haji (2006) explained that smaller family size significantly contributes to technical efficiency, while higher proportions of family labour to total labour force reduces technical efficiency. In essence, the proportion of family labour to total labour force utilised is negatively correlated with the size of land owned by the household (Masterson, 2007).

Among other management factors, pruning vines in good time is extremely important. According to Martin, Davis and Mason (2008) pruning is done to determine the quantity and quality of fruiting wood. In the same context, premature or overdue pruning will definitely affect the fruiting quantity. Early flowering that might be caused by early pruning may expose the vine to late cold which negatively affects production. Timely pruning (*Timely_pruning*) was discovered to be significantly positive at a 1% significance level. The importance of timely pruning cannot be overemphasised, as it is evident that farmers who prune vines on time stand a better chance to achieve greater raisin volumes. In addition, the vineyards' long-term quality is ensured through better pruning management and results in improved farmer efficiency.

In a business environment, entrepreneur skills are required. Farming, like any other business, requires an entrepreneurship driven purpose. What this means is that profit is the end result that keeps the farmer in business. The results indicate that the entrepreneurship variable (*Entrepreneurship*) was positively significant at 5%. It was expected that farmers that possessed entrepreneurship skills were in a position to be technically efficient. Entrepreneurship is a skill or knowledge that can be taught. It is necessary that decision makers either learn from entrepreneurial, affluent farmers or the EAC can assist with sourcing learning material and/or contracting consultants. The sourcing is in line with FT objective which highlights that co-operatives registered to FT should be committed to promote famer and community development for the long-term development of the community. Entrepreneurship learning should be seen by farmers as a long-term investment that will empower him/her with better business knowledge towards business planning and decisions. The results from the analysis of the factors that affect technical efficiency levels of the farmers from Eksteenskuil thus provide evidence of the potential of training in entrepreneurship as recommended in NDP (2011).

In the analysis, middle island (*DMIsland*) was used a proxy for soil quality. During the discussions about the background of the region, it was mentioned that the middle island has better soil fertility, although evidence of that was never physically tested. In spite of the physical testing, the results were as expected found to be positive and significant at 10%. The implication is that farmers farming on the middle island are likely to perform well due to soil fertility. Farmers farming on the other islands are encouraged to improve the soil fertility of their current farming plots. The results are in line with Binam *et al*. (2004), who also indicates that the better the soil quality on which the farm is located, the more likely that the farmer will be technically efficient. It

is important for raisin farmers to look after their soil because vines are a perennial crop and a long-term investment such as maintaining the soil is crucial for future crop returns.

In this study a social capital index (*SCI*) was employed. According to the analysis, the social capital was identified to be significant at a 10% significance level. A possible justification for the negative sign is that when developing the index, productive and unproductive social practices were combined into one index. Binam *et al*. (2004) and most other researchers point out that being involved in a farmers' association or group is beneficial as it allows farmers to come together and share ideas and information. The importance of associations to a farmer is linked to a likelihood of learning more about best practice relevant to his/her enterprise. Farmers who tend to frequently socialise unnecessarily or who are involved in non-farming associations may lose sight of his/her farming functions. The importance of giving the farming enterprise undivided attention cannot be overemphasised in this instance.

The size of the land indicates the full utilisation of the existing potential of the farm. Moreover, large farmers in terms of scale are expected to use more hired labour and intensive supervision. Large farms were associated with less social capital and therefore were able to attend to farming requirements. Small-scale farmers farming at a larger scale than other farmers were also likely have an entrepreneurial drive which persuades them to invest in expansion and/or re-establishment. The evidence of the importance of land under crops (*Area*) is seen in Table 4.4, where *area* is positively significant at 1%. Farmers with a larger area under crops are expected to pay more attention to managing their farms and less on unproductive social activities. Hence, farmers with a large area were likely to be efficient. The results thus show that rural development will likely benefit if government was to adhere to recommendations by NDP (2011) and CRDP (2009) to secure tenure of the farmers in rural areas, since farmers then will be able to expand their scale of production.

The discussion of the results from the regression analysis concludes the analysis of the levels of technical efficiency of the raisin producers from Eksteenskuil. In the next section the focus shifts to the level of allocative efficiency of the farmers from Eksteenskuil.

4.5.4.2 Allocative efficiency analysis of raisin producers from Eksteenskuil

The analysis of the allocative efficiency of the raisin producers from Eksteenskuil is divided into two sections. Firstly, the allocative efficiency scores are calculated for each farmer, after which the relationship between allocative efficiency and economic literacy is explored to gain insight into the contribution of economic literacy levels of the decision makers to their ability to select the optimal combination of production inputs.

4.5.4.2.1 Quantifying allocative efficiency levels of raisin producers from Eksteenskuil

For the purpose of this study the cost efficiency of the raisin producers from Eksteenskuil is expressed as their levels of allocative efficiency. The cost efficiency of the farmers is a comparison of the current cost paid by the farmers and the minimum cost they should have paid by selecting the cost minimising combination of production inputs to produce their raisins. For example, if the minimum cost required to produce a certain quantity of raisins is 80% of the cost the farmers have actually incurred, the level of allocative efficiency of the farmer is 0.8. By implication, that farmer could have produced the raisins at 80% of his current costs.

A cumulative probability distribution of the allocative efficiency scores of raisin producers from Eksteenskuil is shown in Figure 4.12.

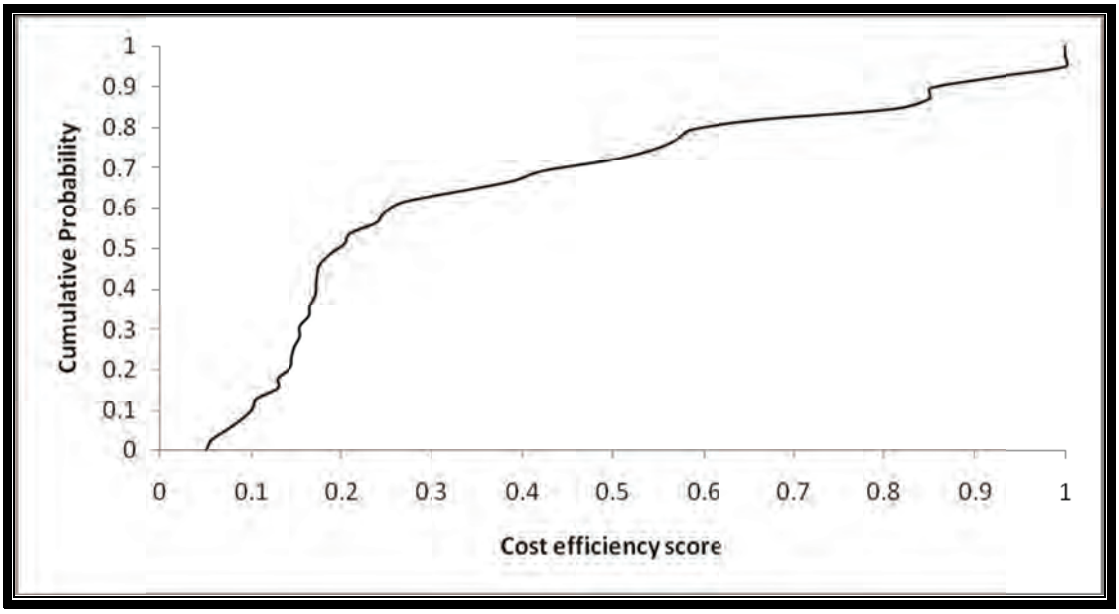

Figure 4. 12: Cumulative probability distribution of allocative efficiency scores of raisin producers from Eksteenskuil.

Figure 4.12 shows that substantially fewer farmers are allocatively efficient compared to technically efficient. Only three (about five percent) of the farmers scored an allocative efficiency score of one, which suggests that 95% of the farmers could have reduced their costs to produce their raisins. Interestingly, more than 50% of the respondents obtained allocative efficiency scores of less than 0.2. By implication, 50% of the respondents could have produced their raisins at less than 20% of their current cost. When considering the fact that the farmers do not have sufficient cash flow to use the recommended levels of inputs, the poor performance of the farmers in terms of allocative efficiency is a major cause for concern.

The respondents are grouped into three groups based on their allocative efficiency scores. The average allocative efficiency score of the upper third group of farmers is 0.75. The upper third group of farmers thus could have produced their raisins at 75% of their current cost. The average score for the middle group of farmers is substantially lower at 0.23, which suggests that they could have produced their raisins at 23% of their current cost. The bottom third group of farmers scored an average allocative efficiency score of 0.12. Those farmers who are grouped into the bottom third thus could have produced their raisins at 12% of their current cost. Evidently there is huge scope in assisting and training the farmers in terms of input combinations to minimise production costs.

4.5.4.2.2 Exploring the relationship between economic literacy and allocative efficiency levels of raisin producers from Eksteenskuil

The main purpose of this section is to determine whether economic literacy affects the cost efficiency of respondents presented in the previous section. The procedures to quantify economic literacy of the farmers from Eksteenskuil are shown in Appendix C. A Tobit Regression Model was employed to relate economic literacy to the efficiency scores. The Tobit model was used because efficiency scores vary between zero and one and the Tobit model could censor the efficiency scores from above. The literature indicates that economic literacy is usually measured by scoring the answers like a test and expressing economic literacy as one value. Against all expectations, the economic literacy of Eksteenskuil respondents was found to not significantly affect cost efficiency measured as a single score. Thus all aspects of economic literacy combined do not have an effect on decision making in terms of input use.

The proxies for economic literacy were also regressed separately on allocative efficiency scores to see whether some proxies on their own do influence allocative efficiency levels. Table 4.5 shows the results for the Tobit regression analysis of the economic literacy determinants and includes the coefficients and probabilities for the hypothesised economic literacy variables. The probability represents the relative significance level of each variable while the sign of the coefficient indicates the direction of the influence of the independent variable on the level of allocative efficiency.

Table 4. 5: Tobit regression results of economic literacy affecting cost efficiency.

Variable	Coefficient	Standard Error	z-Statistic	Probability
Intercept	1.3121	0.5614	2.3374	0.0194**
Applied Economic Concepts				
Transport	0.2658	0.1006	2.6412	0.0083***
Fertiliser	-0.1638	0.0959	-1.7073	0.0878*
Water	-0.1471	0.0681	-2.1622	0.0306**
Labour	-0.0301	0.0641	-0.4686	0.6394
Comprehension of Economic Concepts				
Demand	-0.1018	0.0978	-1.0408	0.2980
Exchange rate	-0.1033	0.1200	-0.8612	0.3891
Prime interest rate	0.0627	0.1604	0.3906	0.6961
Goodness of Fit				
R^2_{ANOVA}	0.4425			
R^2_{DECOMP}	0.3885			

Note: ******* indicate significance at a 1% level; ****** indicate significance at a 5% level

Green (2002) suggested two measures that can be used to determine the goodness of fit for the Tobit model an: "ANOVA-based" fit measure (R^2_{ANOVA} **)** and a "decomposition-based" fit measure (R^2_{DECOMP} **)**. The R^2_{ANOVA} takes the variance of the estimated conditional mean divided by the variance of the observed variable. The R^2_{DECOMP} takes the variance of the conditional mean function around the overall mean of the data in the numerator. Higher values for both measures indicate a better fit. The R^2_{ANOVA} for the Tobit model was 0.44, while the R^2_{DECOMP} was 0.39. Hartwick *et al.* (2007) found a R^2_{ANOVA} measure of 0.370 and a R^2_{DECOMP} measure of 0.379 in their study on knowledge management for agricultural innovation. Hartwick *et al.* (2007) concluded that the measures in their study constitute a very comfortable level of overall fit. Since R^2_{ANOVA} and R^2_{DECOMP} presented in Table 5.5 are higher than those found by Hartwick *et al*. (2007), it is concluded that the overall fit of the Tobit model is satisfactory. Next, the significance of the individual variables is judged.

Interestingly, Table 5.5 shows that the economic literacy questions within the comprehension economic concepts group did not have a statistically significant effect on cost efficiency. The economic literacy factors that did significantly affect cost efficiency are all questions within the applied economic concepts group. Applying transport cost estimates correctly to decide whether or not to sell to the new processor had an effect on cost efficiency. The transportation question was constructed to determine the farmers' knowledge of the cost of delivering raisins, as well as the ability to make a rational decision to potentially increase income. As expected, the

coefficient of the transport question showed a positive correlation with cost efficiency. Knowledge of transportation costs and rational decisions to sell to a different processor in order to achieve higher profits, had a statistically significant effect of one percent ($p<0.01$) on cost efficiency. Respondents who were able to make an informed rational decision to deliver and sell raisins to the processor offering a higher price, consequently raising profits, were the more cost efficient respondents.

The other question within the applied economic concept group is the question on ranking important production inputs when money to buy the specific inputs is limited. The question includes four important inputs: fertiliser, water, labour and chemicals. Respondents were asked to rank inputs in order of importance when funds to buy the inputs are limited. Inputs included in the regression model are fertiliser, water and labour. Chemicals were not included in the regression model because together these four variables are perfectly correlated. The results show that the rank order of fertiliser and water were statistically significant in explaining cost efficiency. Labour was not statistically significant as a factor influencing cost efficiency. Fertiliser was estimated to be statistical significantly at a five percent ($p<0.05$) level. The negative sign of the coefficient shows that farmers who consider fertiliser as an important input to buy when money is limited, will be less cost efficient. The negative relationship between the fertiliser ranking and cost efficiency is unexpected. Reasons for this result are explained by making use of Figure 4.13. This shows the cumulative probability distribution of cost efficiency across different types of fertiliser usages (manure, inorganic fertiliser or a combination of both) among respondents. The probability distributions leaning towards the right of the graph are considered to be more cost efficient.

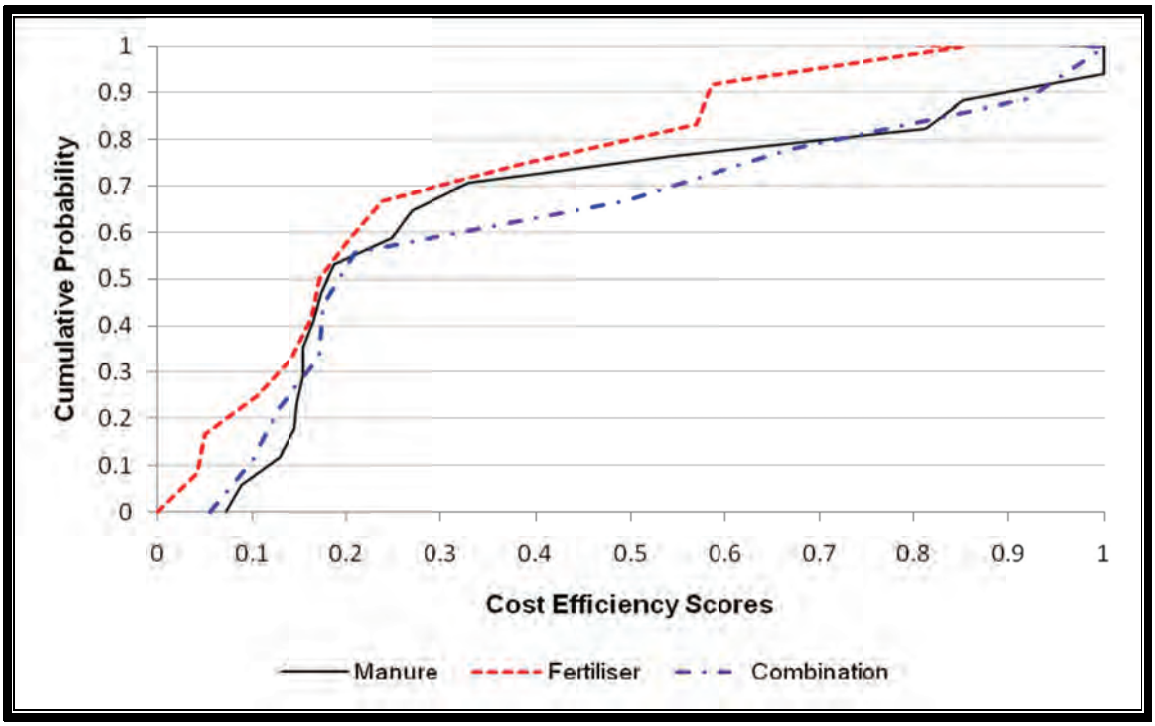

Figure 4. 13: Cumulative probability distribution of cost efficiency in relation to different fertiliser usages of small-scale farmers in Eksteenskuil.

Figure 4.13 show that farmers using a combination of fertiliser types will have the highest probability of being cost efficient. Farmers using only inorganic fertiliser have the lowest probability of being cost efficient. Respondents using only manure have a higher probability of being cost efficient than respondents using only inorganic fertiliser. In fact, all three cost efficient respondents used only manure. Most of the Eksteenskuil farmers do not have to pay for manure, since a lot of these farmers also have livestock enterprises. The few farmers that did buy manure received the manure at a very low price. Manure, however, has lower levels of N, P and K, leading to low productivity of grapevines at a low price. Inorganic fertiliser has higher levels of N, P and K leading to high productivity of grapevines, but inorganic fertiliser can also be very expensive. A combination of manure and inorganic fertiliser will increase the productivity, while lowering the cost of fertiliser. Respondents using only manure might not have an output as good as farmers using inorganic fertiliser or a combination, but their fertiliser cost will be much lower. Taking all of this into consideration, farmers showing higher levels of economic literacy will make a rational decision to allocate their limited resources to an input other than fertiliser, because they have access to manure that is free or at least much cheaper than inorganic fertiliser. This result shows that the ability to make the correct economic decisions will improve cost efficiency scores.

Another input from the input ranking question to significantly influence cost efficiency was ranking water as an important input. Respondents were asked to rank water as a choice-input to buy if they only had enough money for only one input. Table 5.5 shows that ranking water as an

important input had a statistically significant effect on cost efficiency at a five percent ($p<0.05$) level. Allocating limited funds to buy water had a negative effect on cost efficiency, which is in accordance with the hypothesis. Results indicate that the more farmers consider water as an important input to be bought when funds are low, the lower their cost efficiency. Most of the farmers farming in Eksteenskuil do not currently pay for water use, making a money allocation to buy water before other important inputs irrational. Farmers who take into consideration that they do not currently pay for water, and for this reason do not allocate their limited resources to water, show a higher level of economic literacy. This result again shows that being able to make the correct economic decisions will have an effect on how cost efficiently respondents will produce output.

Economic literacy factors that were found not to significantly influence cost efficiency does not necessarily imply that the factors have no effect on the cost efficiency of raisin production. It only implies that comparatively the influence was not significant to cost efficiency. The results show that farmers who are aware of the economic surrounding of their farming practices and are able to apply rational thinking within certain economic situations are able to select the combination of inputs that minimise the cost of producing raisins. These farmers are considered as more economically literate. Thus, although the combined index was found not to be significant, individual proxies were actually found to have a significant impact on the levels of allocative efficiency of the farmers. Economic literacy thus proves to have a role to play in improving profit levels of smallholder raisin producers at Eksteenskuil.

Next the focus shifts to an analysis of the economic efficiency of Eksteenskuil raisin producers.

4.5.4.3 Economic efficiency analysis of raisin producers from Eksteenskuil

The level of economic efficiency of a farmer is the product of his technical and allocative efficiency scores. Only farmers who show both technical and allocative efficiency are considered to be economically efficient. Figure 4.14 is the cumulative probability distribution graph of the economic efficiency scores of the raisin producers from Eksteenskuil.

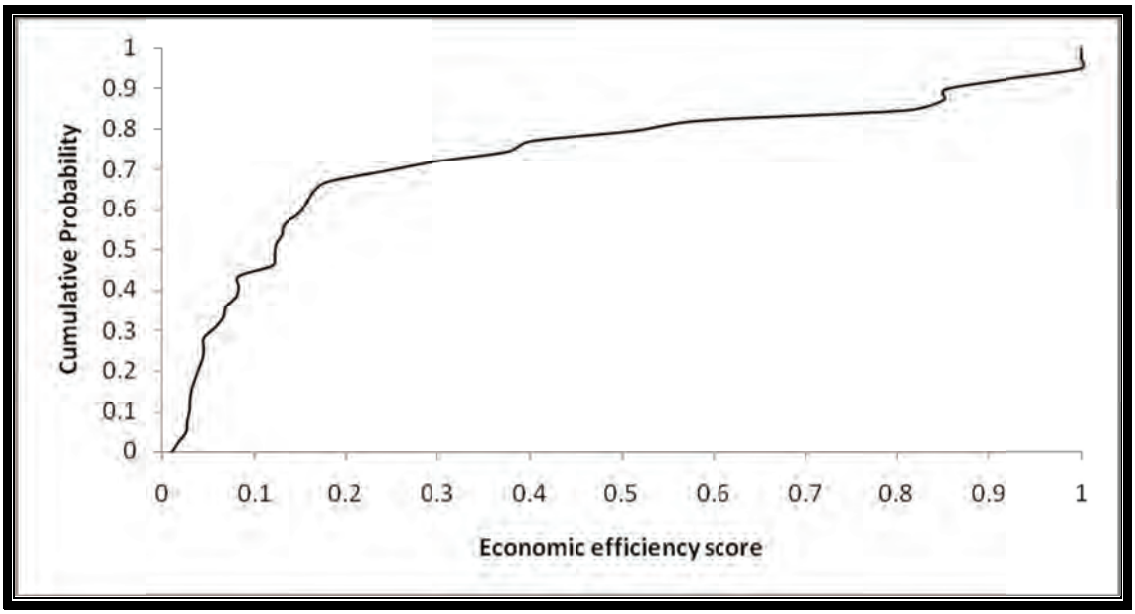

Figure 4. 14: Cumulative probability distribution of economic efficiency scores of raisin producers from Eksteenskuil.

As expected, the proportion of farmers who are considered to be economically efficient is very small. Only three (about five percent) of the respondents obtained an economic efficiency score of one. The average economic efficiency score of the upper third of farmers is only 0.68 compared to the average allocative efficiency score of 0.75 and the average technical efficiency score of 0.98. The average economic efficiency scores for the middle and lower third groups of farmers are 0.12 and 0.04 respectively. Clearly there is huge scope for improvement for the bottom two thirds of farmers.

The low levels of allocative and economic efficiency compared to the technical efficiency scores of the farmers suggest that the farmers perform better at the technical side of the production sub-decision making unit. There is, however, scope to improve the ability of the farmers to ensure that they select that combinations of inputs that will allow them to minimise their production cost. In the next section, the emphasis is on the levels of marketing efficiency of the raisin producers from Eksteenskuil.

4.5.4.4 Marketing efficiency analysis of raisin producers from Eksteenskuil

The analysis of the marketing efficiency of the raisin producers is concerned with the marketing sub-DMU, which aims to sell the products that were produced by the production sub-DMU in order to generate the highest possible revenue. The level of marketing efficiency of a farmer is an indication of the level to which the farmer is able to earn the highest possible revenue from the products he has produced. The marketing efficiency score of a farmer is his

current revenue expressed as a proportion of the maximum revenue that could have been earned.

The marketing efficiency of raisin producers is an interesting case. All farmers from Eksteenskuil sell their raisins to the same buyer (SAD) and receive the same prices for the respective grades (choice, standard and industrial). The ability of the farmer to generate the maximum amount of revenue from the raisins thus depends on the grades achieved by the farmer, and the level to which he/she has produced the maximum amount of output from his current input levels. The larger the proportion of raisins that qualify for choice grade, the higher the revenue the farmer is able to earn. Figure 4.15 represents a cumulative probability distribution graph of the marketing efficiency scores of the raisin producers from Eksteenskuil.

Figure 4. 15: Cumulative probability distribution of the marketing efficiency scores of raisin producers from Eksteenskuil.

Figure 4.15 shows that about 25% of the respondents obtained a marketing efficiency score of one. Those 11 farmers thus could not have increased the revenue they generated from their raisins. The average marketing efficiency score of the upper third of farmers is also high at 0.97. On the other hand, the average marketing efficiency scores for the middle and bottom third groups of farmers are 0.56 and 0.25 respectively. Those farmers thus could have increased their revenues by 44% and 75% on average respectively. Since only 25% of the farmers achieved less than 80% choice grade, and about seven percent of the farmers achieved less than 75% choice grade, it is evident that the marketing efficiency is mainly driven by the ability of the farmers to produce the maximum possible yield from their current input levels.

The next section focuses on the level of overall efficiency of both the production and the marketing sub-DMUs.

4.5.4.5 Overall efficiency analysis of raisin producers from Eksteenskuil

The overall efficiency of a farmer is an indication of the level to which the farmer was able to earn the highest possible return on the inputs that he has used in production activities. The overall efficiency is the product of the level of technical efficiency and marketing efficiency of the farmer. Figure 4.16 represents the cumulative probability distribution function graph of the overall efficiency scores of the raisin producers from Eksteenskuil.

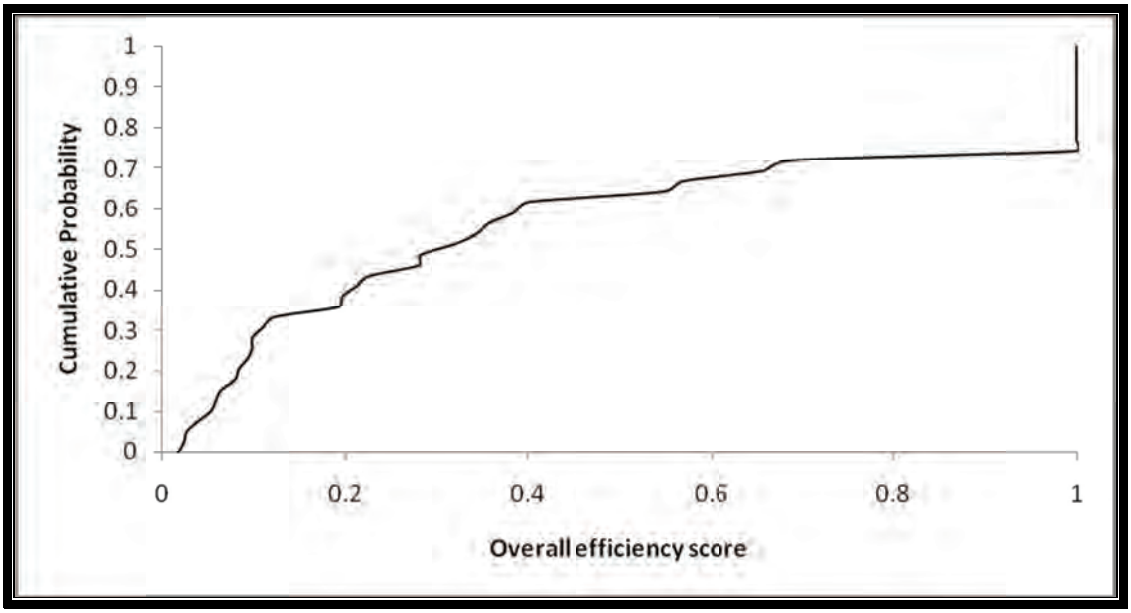

Figure 4. 16: Cumulative probability distribution of the overall efficiency scores of raisin producers from Eksteenskuil.

Again, a farmer can only be considered to be overall efficient if he is both technically and marketing efficient. Figure 4.16 shows that about 25% of the farmers from Eksteenskuil can be considered to be overall efficient. By implication, those farmers have produced the highest possible yields with their current input levels, and they also received the highest possible revenue from their raisins. Thus, 25% of the raisin producers from Eksteenskuil may be considered to performing relatively well.

When considering the middle third group of farmers, the average overall efficiency score is 0.33, while that of the lower third is only 0.07. Thus, although the top 25% of farmers from Eksteenskuil are really performing well, the performance of the vast majority of raisin producers from Eksteenskuil is a cause for concern. The approach that is used to quantify the efficiency scores only benchmark the farmers to other farmers from Eksteenskuil. The low

efficiency scores thus imply that, under similar conditions, the vast majority of farmers from Eksteenskuil are performing poorly. It also implies that there is huge scope for training and support at Eksteenskuil to enhance the performance of the farmers. There is also scope for initiatives to contribute to allowing farmers from Eksteenskuil to learn from each other, i.e. learning networks. The findings thus show the potential benefit associated with the recommendation by NDP (2011) to stimulate farmer-to-farmer skills transfer.

4.5.5 CONCLUSIONS

The aim of this section was to conduct a NIE analysis of the case of Eksteenskuil raisin producers in order to get an understanding of the reasons why the farmers behave the way they do within their value chain. Based on the analysis, the conclusion is that the social and institutional environments of the Eksteenskuil farmers do affect the way they operate and perform. The analysis of the levels of social embeddedness of the farmers highlighted the reasons why the farmers from Eksteenskuil have a negative perception of government. The majority of farmers are still waiting for the transfer of the title deeds into their names, and the farmers also perceive government to be unwilling to support them. There are also some internal political issues that affect the behaviour of the farmers. Interestingly, some of the internal political ructions are caused by the "interference" of external parties who actually aim to contribute to alleviating poverty within the Eksteenskuil community. Care should be taken by organisations to consider the social dynamics within the community when entering a community with projects that aim to benefit the community.

The analysis of the social capital of the farmers showed that, in general, the farmers' levels of cognitive social capital are higher than their structural social capital. The farmers' levels of trust and the levels to which they say they get along with other members in the community outweigh the level to which they actively participate in group activities within the community. Interestingly, none of the farmers scored 100% for the level of overall social capital, but also none of the farmers scored zero to indicate no social capital at all. The conclusion is that there is good potential for the farmers from Eksteenskuil to successfully use collective action as recommended by NDP (2011) and the DTI (South African LED Network, 2012). The high levels of social capital also suggest that the farmers may be open for initiatives that stimulate farmer-to-farmer skills transfer as recommended by NDP (2011).

One can also conclude that, if the incentives are correctly aligned and the necessary support structures are available, emerging farmers may be willing and able to comply with stringent requirements to participate in commercial agri-food chains. In terms of the institutional environment within which the farmers from Eksteenskuil operate, it is evident that the farmers do comply with a number of strict rules and regulations in order to be able to participate in the fair-trade initiative. While one would have expected that resource-poor farmers would struggle

to meet the requirements, the farmers from Eksteenskuil prove that being resource-poor should not necessarily exclude one from participating in lucrative export markets. Note, however, that through institutional innovation by the fair-trade initiative, a level of complementarity was created that incentivise SAD and Traidcraft to support the farmers to meet the requirements. SAD and Traidcraft have a vested interest in the performance of the farmers since they only benefit from the fair-trade initiative through getting access to the raisins produced by the farmers from Eksteenskuil. The results also show that farmers can be incentivised to organise themselves in an appropriate collective entity (i.e. an agricultural co-operative in the case of Eksteenskuil) if business conditions are such that the farmers will benefit financially from collective action. Instead of incentivising the formation of agricultural co-operatives by giving people access to government grants for being members of co-operatives based on the (unfair) assumption that the people will use the money for farming purposes, incentives that stimulate farmers' efforts to conduct business will ensure that farmers will organise themselves in the appropriate collective entity (if necessary), and that incentives are used for the correct purpose. Ultimately, the case of Eksteenskuil thus proves that one can change the behaviour of resource-poor farmers and their transacting partners by means of correctly aligned incentives through institutional innovation.

The analysis of the governance structures leads to the conclusion that there is a need for a relatively high degree of intensity of coordination control given the attributes of the transaction between the Eksteenskuil farmers and SAD. Currently there may be a mismatch between the intensity of control and the cost of coordination errors. Based on the applications of the Mahoney framework and the decision-making framework by Peterson *et al*. (2001), a relation-based strategic alliance may be a better match, which also confirms the potential of the standard recommendation in CRDP (2010). Although the Eksteenskuil farmers already view SAD as their strategic partner, it may be worthwhile to formalise the relationship to ensure that both parties benefit optimally from such a relationship. The results from the analysis of the governance structures for the case of Eksteenskuil, however, show that the optimal degree of coordination between the farmers and the identified partner depends on the characteristics of the transaction. The identification of a potential partner as recommended by NDP (2011) thus is only the first step. A comprehensive analysis is required to determine the optimal degree of coordination to ensure that the farmers will benefit optimally from the relationship with the agro-processing company.

When analysing the levels of efficiency of the farmers as a means for analysing the resource allocation within the fourth level of the NIE framework, one can conclude that there is major scope for improving the levels of efficiency with which the farmers use their available production inputs. Overall, the conclusion after the analyses of all of the different types of efficiencies that relate to the production and marketing of raisins by farmers from Eksteenskuil is that there is major scope to improve the performance of the farmers within their current

technology set. The results show that the majority of farmers can substantially increase their yields by using their current inputs more efficiently, and they can also produce their yields at substantially lower costs by adjusting the combination of inputs that are used to produce their raisins. Thus, there is scope for the farmers from Eksteenskuil to increase their performance by using their production inputs optimally as recommended by CRDP (2009). While it is recognised that the farmers do face a number of stumbling blocks that contribute to making it difficult for them to participate in the fair-trade value chain, and that improved technology may contribute to improving their performance, the results show that there is also scope to support the farmers in their day-to-day decision making with regard to input use in their farm businesses. The focus of research and development efforts to improve the performance of emerging farmers thus should be more holistic than focussing only on a single aspect (i.e. improving technology).The identification of peers also proves that there is scope for farmer-to farmer skills transfer, as recommended by NDP (2011), in the case of Eksteenskuil

The discussion of the highlights of the research concludes the section on the NIE analysis for the case of Eksteenskuil. In the next section the emphasis moves to the analysis of the value chain for raisins to better understand the flow of the physical product, the distribution of value along the channel, and also the volumes of water that are used at the respective stages of value adding to determine the value of the water that was used to deliver raisins to the end consumer.

4.6 VALUE CHAIN MAPS FOR RAISINS

The process of analysing the value chain for raisins starts with compiling a product flow map to get an understanding of the flow of the physical product from the farm, through all the respective processes of value adding, till the point where it reaches the final consumer. The product flow map then is extended to include the value that is added at each of the respective stages of value adding within the chain in order to better understand the distribution of the value of the raisins as they moves along the value chain. Lastly, the value chain map again is extended by including the volume of water that is used at the respective stages of value adding along the chain. Considering water use along the chain allows for quantifying the total volume of water required to produce the raisins and finally delivering them to the end consumer. It also allows for quantifying the true value of the water that was initially allocated to the production of raisins at Eksteenskuil.

Recall that the aim of this study is to contribute to improving the performance of emerging farmers to allow them to sustainably participate in commercial agri-food chains. The analysis of the value chain within which the Eksteenskuil farmers operate thus also includes an assessment of the support structures (at a meso level) that are available to support the

farmers to meet the strict requirements (at a macro level) to participate in a commercial agri-food chain.

4.6.1 FLOW OF RAISINS FROM INPUT SUPPLIERS TO THE END BUYER

A schematic representation of the product flow is shown in Figure 4.17. Despite Eksteenskuil farmers being organised as the Eksteenskuil Agricultural Cooperative (EAC), members of EAC do not produce nor market collectively. Farmers produce individually and each farmer is responsible for selling his own produce and delivering it to the depot of South African Dried Fruit (SAD) in Keimoes.

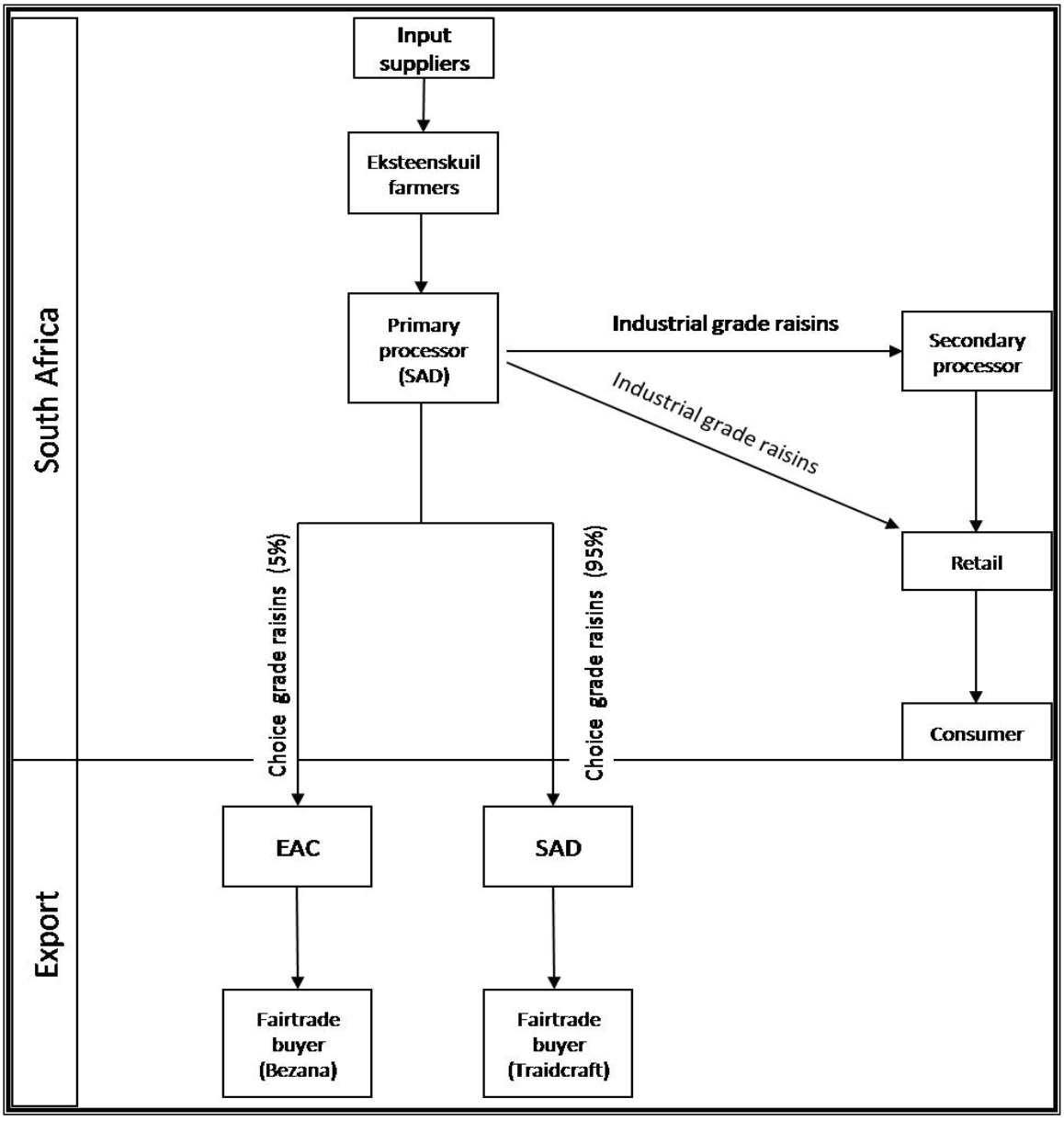

Figure 4. 17: Schematic representation of the flow of raisins from Eksteenskuil producers to the end buyer.

At the processor, SAD grades the raisins based on quality into choice grade, standard grade and industrial grade. SAD makes no distinction between Eksteenskuil farmers and commercial farmers. Everybody receives the same price for the respective grades. Standard grade and industrial grade raisins are marketed on the local market mainly through secondary processors where they are used as an ingredient in the baking industry. Choice grade raisins are exported via the fair-trade initiative. Eksteenskuil farmers who sell their choice grade raisins through the fair-trade initiative do receive an additional payment from the fair-trade buyer once the raisins have been exported. The additional payment is made possible through the fair price which the fair-trade buyer is willing to pay to previously marginalised producers.

SAD is the only fair-trade accredited processor in the area, hence Eksteenskuil farmers have no choice other than to sell their raisins to SAD if they want to participate in the fair-trade value chain. Important to note, however, is that farmers do have a choice of within which marketing channel they want to participate. The additional amount paid by fair-trade, however, seems to be enough incentive for them to choose the chain via fair-trade. Fair-trade buyers want to be sure that the higher price is paid only to deserving producers. It is the responsibility of SAD to ensure that only raisins produced by Eksteenskuil producers enter the channel through fair-trade. In order to comply with FLO regulations, SAD keeps raisins delivered by members of EAC separately. When processing Eksteenskuil raisins, they use one of the processing lines exclusively for raisins from EAC members. The processed raisins then get packed into boxes that contain the FLO label to show that it is a fair-trade product. The packed boxes too are kept separately to ensure that no mix up takes place.

After the processing and packaging is done, SAD exports the raisins on behalf of EAC to Traidcraft under the fair-trade agreement. It is noted that it is only the export of raisins that is done collectively by members of EAC. The fair-trade agreement requires that the entity under which the farmers operate is audited annually to ensure that they fulfil the objectives of the fair-trade agreement. Based on such an audit, EAC was advised to participate more actively in export negotiations in order to increase their share in the final price. As a result, EAC bought back about 5% of their processed raisins from SAD and exported them under their own name. They conducted all negotiations with the fair-trade -buyer, but SAD was present in a supportive capacity. Important to note is that the logistics of exporting the raisins was still outsourced to SAD.

From the investigation of the product flow from Eksteenskuil raisin producers to their buyers, two role players that are instrumental in their success can be identified. First of all there is EAC. EAC collects information which then is distributed to farmers. It buys some of the inputs in bulk and then distributes them in smaller volumes to individual farmers. EAC also organises training sessions for farmers. Training sessions include training in the physical aspects of raisin production and marketing, and financial record keeping. On behalf of the members of EAC, the

chairperson of EAC is also actively involved in the negotiations with both SAD and the fair-trade buyer. The functioning of EAC is instrumental in the success of Eksteenskuil raisin producers. The second role player that is instrumental in this is SAD. Technical advisors employed by SAD provide many of the training sessions on the technical aspects of raisin production. SAD is also instrumental in the negotiations with the fair-trade buyer. When they are not negotiating on behalf of EAC, they act in a supporting capacity in negotiations between EAC and the buyer. The processing and exporting activities are also outsourced to SAD since EAC do not have the necessary infrastructure. The incentive for SAD lies therein that they gain access to almost all raisins produced on Eksteenskuil while they also get access to the FLO-label and hence a highly profitable niche market.

The emerging farmers at Eksteenskuil thus do currently participate in a functioning value chain. Contrary to the typical scenario with emerging farmers in South Africa, Eksteenskuil farmers do have access to high quality information, both with respect to production practices and market related information. The support provided by EAC and SAD is instrumental in this regard. The flow of information along the value chain is a result of the high level of complementarity between Eksteenskuil farmers, SAD and the fair-trade buyer. The next section focuses on the distribution of value along the value chain.

4.6.2 DISTRIBUTION OF VALUE ALONG THE VALUE CHAIN FOR RAISINS

Although the value chains for Thompson's Seedless and Golden raisins are conceptually similar, the values of the different types of raisins do differ. For the purpose of this study, the value chain maps for Thompson's Seedless and Golden raisins are presented and discussed separately. The value of the raisins at the farm gate is represented by the gross margin per ton of raisins. The gross margin is calculated by subtracting the direct allocatable costs per ton from the revenue per ton.

The agents downstream along the value chain were very reluctant to provide any information on their cost structures, hence it was not possible to calculate the gross margins at the other nodes. The value of the raisins downstream from the farm gate is expressed in terms of value added. Value added in this case refers to the difference in the price received for the raisins when sold further downstream, and the price paid for the raisins before adding value to them. The value added thus includes remuneration of employees, operating surplus and taxes to government (Crafford *et al*., 2004).

When entering the secondary processing node, the raisins are physically transformed into a new product. Raisins are used as ingredients in the baking industry. The raisins are thus not sold as raisins anymore, but as part of a new product that contains raisins. The value added in the secondary processing node thus cannot simply be calculated by subtracting the purchase

price from the selling price. Doing that implies that all the value that is added is attributed to raisins, which is not fair. Instead, the value added will be allocated pro rata to the different ingredients based on the proportional contribution of the respective ingredients to the total cost of production. For instance, if raisins contribute 10% to the total cost of producing a fruit cake, the value added by raisins will be calculated as 10% of the total value added.

4.6.2.1 Value chain map for Thompson's Seedless raisins produced by Eksteenskuil raisin producers

The value chain for Thompson's Seedless raisins produced by Eksteenskuil raisin producers is shown in Figure 4.18. The value chain shown in Figure 4.18 is for one ton of Thompson's Seedless raisins produced by a farmer who is a member of EAC and hence qualifies to export raisins through the fair-trade initiative (All prices are expressed in 2011 prices).

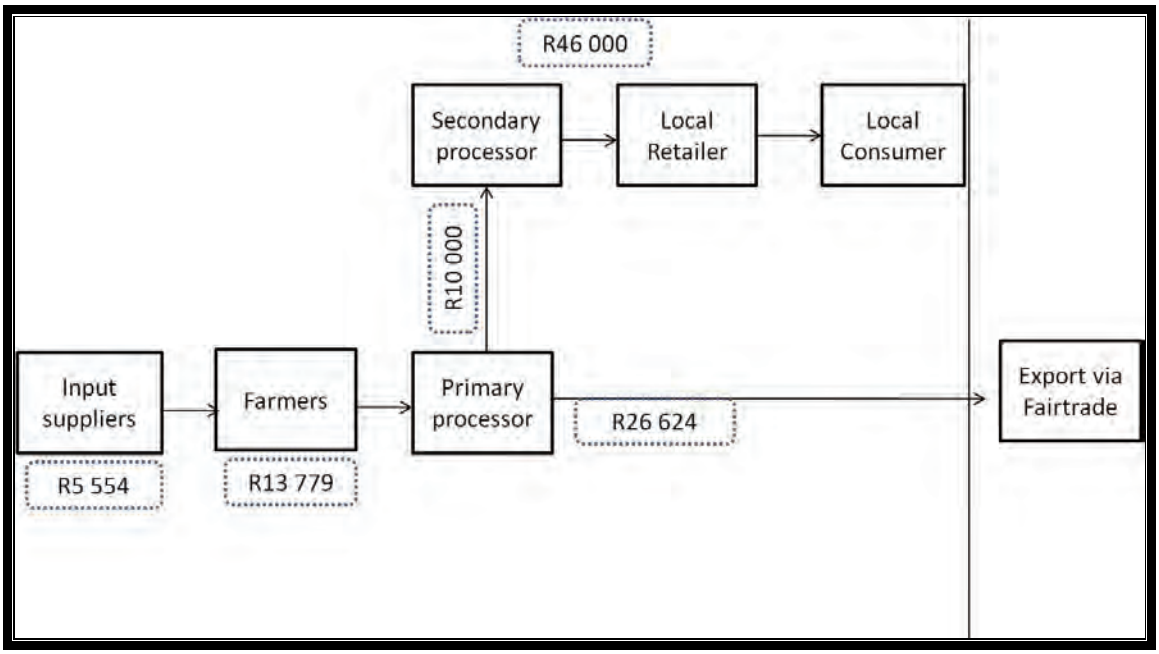

Figure 4. 18: Distribution of value (in 2011 prices) per tonne of Thompson's Seedless raisins produced by Eksteenskuil farmers as it moves along the value chain (R/tonne).

Source: Own calculations

The raisin producer adds value to production inputs by firstly transforming these into grapes which are then dried to become raisins. The average price Eksteenskuil raisin producers receive per ton of Thompson's Seedless raisins sold to SAD is R13.78/kg (R13.48/kg plus the additional payment of R2.50/kg from the 85% of choice grade raisins that are exported via fair-trade, plus the R0.20/kg for the 10% of industrial grade raisins that are sold for R2/kg). The price per ton of Thompson's Seedless raisins received by Eksteenskuil farmers is thus R13 779. The average price is a weighted average based on the distribution of the grading (choice grade, standard

grade, and industrial grade) the farmers have achieved. The direct allocatable costs incurred by raisin producers from Eksteenskuil to produce a ton of raisins on average add up to R5 554/ton. Given that the gross margin is used as a proxy for the value that is added on farm, the farmers add, on average, R8 226/ton of value to their Thompson's Seedless raisins.

When going downstream from the farm gate, there are three main routes the raisins can follow. The respective routes taken depend very much on the grades achieved. From discussions with key role players within the raisin industry it was mentioned that typically about 85% of raisins that are delivered are choice grade, while 10% are industrial grade and the remaining 5% of no value. Thus, one tonne of raisins that are delivered to the primary processors results in 850 kg of choice grade, 100 kg of industrial grade and 50 kg of no value. All choice grade raisins produced by Eksteenskuil producers are exported. Thus, 850 kg of the initial tonne of raisins that were delivered are exported. The 100 kg of industrial grade raisins are mixed with those of commercial farmers after which they are sold to secondary processors. Finally, the 50 kg of raisins that are of no value is thrown away.

When focusing on the raisins that are exported, the fair-trade price for choice grade Thompson's Seedless raisins is R26 624/ tonne. Given that the primary processing company pays the farmers R13 779/ tonne, the value that is added per ton of raisins exported thus amounts to R12 844. Again the value added includes remuneration to employees, operating surpluses and taxes to government.

The next channel that is used to distribute raisins is via secondary processing companies where the raisins are mainly used as an ingredient in the baking industry. The raisins that move via the baking industry are of industrial grade. While the primary processing company pays the farmers R2 000/tonne for industrial grade raisins, they sell them for R10 000/tonne after they have gone through the primary processing process. The primary processing company thus adds value of R8 000/tonne to the industrial grade raisins.

Calculating the value that is added to the raisins at the secondary processing node is more of a challenge. By the time the raisins enter the secondary processing node they are used as ingredients in a number of different products that contain raisins. The challenge when calculating the value that is added to the raisins is to proportionally allocate the total value to the different ingredients. The proportional contribution of the respective ingredients to the total cost of producing the product is used to determine the proportion of the value of the product that needs to be attributed to the respective inputs. If the raisins, for example, contribute 10% to the total cost of producing the product, 10% of the value of the product when it is sold downstream is attributed to raisins.

Five hundred grams of raisins is used to make 3.75 kg of muesli (de Villiers, 2005), which sells for R42/kg. Similarly, 500 grams of cake mix is used to make one fruit cake, which sells for R240/cake (Candy Cake, 2010). In order to make one loaf of raisin bread, which sells for R13.99, one needs 125 grams of raisins. Thirty percent of the total cost of producing raisin bread is for raisins, hence 30% of the value of the raisin bread when selling it is attributed to raisins. The value of the raisins used to produce raisin bread thus amounts to R33/kg. Similarly, given that the cost of raisins contributes 15% to the total cost of making muesli, the value of the raisins when the muesli is sold is R40/kg. Lastly, the cost of raisins represents 21% of the total cost of making a fruit cake. The value of the raisins in the fruit cake when it is sold thus adds up to R66/kg. For the purpose of this study, the value of the raisins when they leave the secondary processing node as ingredients in baked products is calculated as the average of the proportionally allocated values. The value of the raisins when they leave the secondary processing node thus amounts to R46/kg (R46 000/tonne). Given that the raisins used in the secondary processing node are sold by the primary processing companies for R10 000/tonne, the value that is added to the raisins by the secondary processors is R36 000/tonne.

When considering the distribution of the different grades achieved by raisin producers from Eksteenskuil, the final value of a ton of Eksteenskuil raisins can be calculated. From one ton of raisins, 0.85 tonne are choice grade and exported via the fair-trade initiative, 0.10 tonne are industrial grade and are used in the baking industry, while 0.05 tonne is of no value and thrown away. The final value of the initial ton of raisins is calculated by adding the value of the share of raisins that were exported (0.85 x R26 624/tonne) to the value of the share of the raisins that were used in the baking industry (0.1 x R46 000). The final value of the ton of raisins adds up to R27 230/tonne. The total value that is added from the farm to the end buyer is the difference in the final value of the ton of raisins, and the cost of producing one tonne of raisins on the farm. The total value that is added along the value chain is thus R21 676/tonne of raisins produced at Eksteenskuil.

4.6.2.2 Value chain map for Golden sultana raisins produced by Eksteenskuil or commercial raisin producers

EAC did not export golden raisins through the fair-trade initiative during the past season, hence the farmers from Eksteenskuil who produced golden raisins had to sell them through the same channel as the commercial farmers. All the choice grade raisins were exported by SAD. The value chain for golden raisins is shown in Figure 4.19. The value is expressed per tonne of raisins as it moves along the chain towards the end consumer.

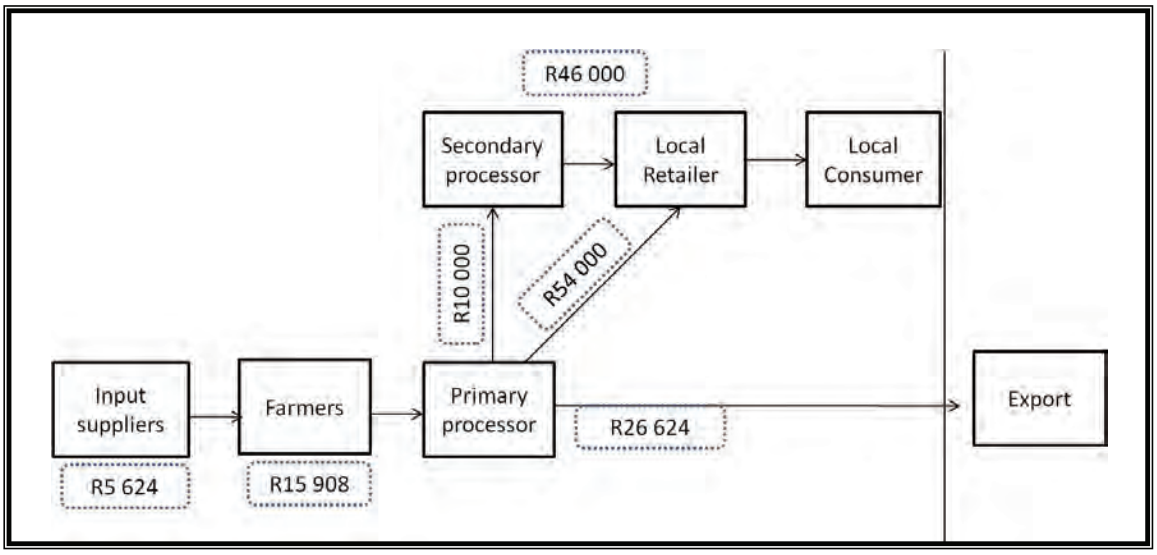

Figure 4. 19: Distribution of value (in 2011 prices) per tonne of Golden raisins produced by Eksteenskuil or commercial farmers as it moves along the value chain (R/tonne).

Source: Own calculations

Golden raisins are produced from the same grapes as Thompson's Seedless, hence the production cost to produce the grapes is similar to that of Thompson's Seedless raisins. It is only the drying method that determines the colour of the final raisins. In order to produce golden raisins, the harvested grapes are treated with a drying chemical before they are smoked with sulphur. The only difference in the production cost for golden raisins compared to Thompson's Seedless is the drying chemicals that are used for Golden raisins. Given that the cost of the drying chemicals is R390/ha, the drying cost per tonne of Golden raisins adds up to R70.91/tonne (R390/ha divided by 5.5 tonne/ha). The total direct allocatable cost for Golden raisins thus amounts to R5 624.91/tonne.

The average price obtained per tonne of golden raisins was R15 908/tonne given that 85% of the raisins qualify for choice grade (earning a price of R18 480/tonne) and 10% qualify for industrial grade at R2 000/tonne). When subtracting the direct allocatable cost from the price, the gross margin per ton of golden raisins adds up to R10 064/tonne. Those farmers who are producing golden raisins thus add value of R10 283.09 per tonne of golden raisins sold to SAD.

Since there is no difference in the prices for Thompson's Seedless and golden raisins as they move through the secondary processing node, the value added per ton of raisins that leaves the primary processor en route to the secondary processors amount to R8 000/tonne (from R2 000/tonne to R10 000/tonne). The value added by the secondary processors who use the golden raisins as ingredients in baked products is R36 000/tonne (From R10 000/tonne to R46 000/tonne). Again there is evidence that moving the raisins through the secondary processing node is associated with the highest value added. Note, however, that the gross

margin at farm level for industrial grade raisins sold through the secondary processors is only R1 415 per tonne. Even though the highest value is added to the raisins that move through the secondary processors, the smallest proportion of the value is distributed to the farmers for raisins that move through the secondary processors.

Given the distribution of the grades, it is possible to calculate the final value of a tonne of golden raisins by the time it reaches the end buyer. From one tonne of raisins, 850 kg are choice grade, 100 kg are industrial grade, and the remaining 50 kg are of no value and are thrown away. Seventy five percent of the choice grade raisins is exported, 20% is sold to retailers to be sold as raisins (final product), while the remaining five percent is used as an ingredient in the baking industry. All of the industrial grade raisins are used in the baking industry. The final value of the initial ton of raisins is calculated by adding the value of the share of raisins that were sold through the respective channels. The final value of the tonne of golden raisins is thus R32 707/tonne (637 kg choice grade raisins exported at R26.62/kg; 170 kg choice grade raisins sold through retail stores at R54/kg; 43 kg of choice grade raisins sold through secondary processors at R46/kg; and 100 kg of industrial grade raisins sold through secondary processors at R46/kg). There is no difference in the value of golden raisins produced by farmers from Eksteenskuil and commercial farmers.

4.6.2.3 Value chain map for Thompson's Seedless raisins produced by commercial raisin producers

The value chain map for commercial farmers (Figure 20) is conceptually similar to that of the farmers from Eksteenskuil (Figure 4.18). The production cost of Thompson's Seedless raisins produced by commercial raisin producers is R5 554/tonne, which is the same as for Eksteenskuil producers. Both groups of farmers buy their inputs from the same suppliers, with Eksteenskuil producers receiving no preferential treatment compared to commercial farmers.

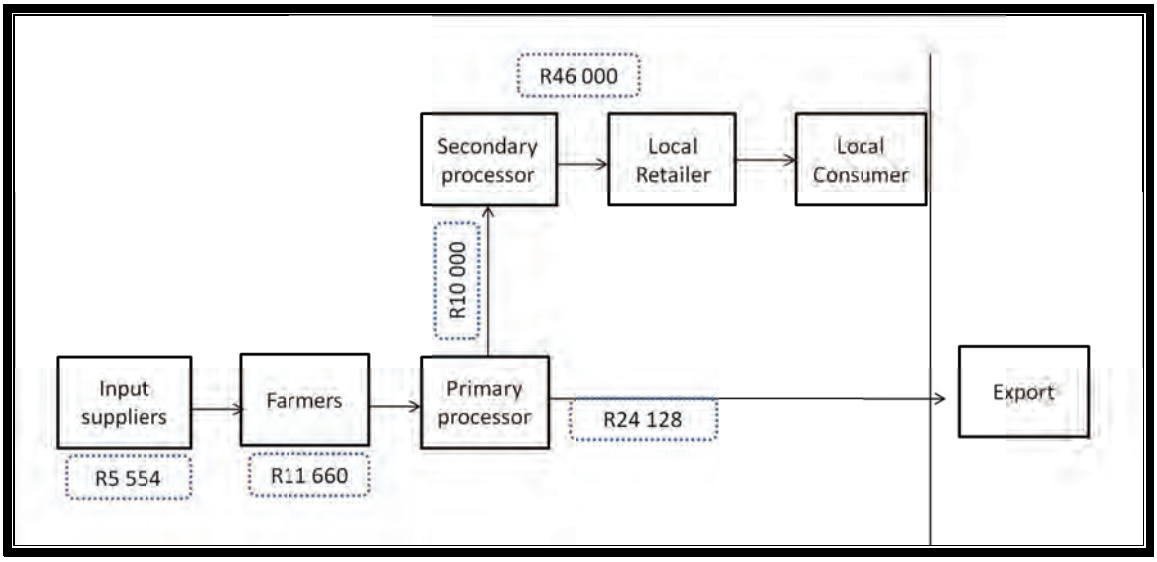

Figure 4. 20: Distribution of value (in 2011 prices) per ton of Thompson's Seedless raisins produced by commercial farmers as it moves along the value chain (R/tonne).

Source: Own calculations

Assuming the same typical grading as Eksteenskuil producers, 850 kg of choice grade, 100 kg of industrial grade and 50 kg raisins of no value are realised from one tonne of raisins delivered to the primary processor. Given that the farm gate price for choice grade Thompson's Seedless is R13 480/tonne and the price for industrial grade raisins is R2 000/tonne, the value of the initial tonne of raisins is R11 660 as it leaves the farm gate. By implication, the production node of the value chain added R6 104/tonne. Similar to the industrial grade raisins of Eksteenskuil producers, the 100 kg of industrial grade raisins are sold for R10 000/tonne to secondary processors who typically use the raisins for baking.

The major difference in the flow of Thompson raisins that were produced by commercial raisin producers lies in the flow of choice grade raisins downstream from the primary processors. Seventy five percent of choice grade Thompson raisins are exported, 20% is sold to retail stores as raisins (final product), while the remaining five percent is used as ingredient in the baking industry. Of the 850 kg of choice grade Thompson raisins that were produced by a commercial farmer, 637 kg is exported, 170 kg is sold through retail stores, and the remaining 43 kg is sold to secondary processors to be used as ingredients in baked products.

The export price for Thompson's Seedless is R24 128/ton, the retail price for choice grade raisins is R54 000/tonne, and the price per tonne of raisins as ingredient in the baking industry is R46 000/tonne. The final value of the initial tonne of raisins produced by a commercial farmer along the Orange River thus can be calculated by adding the values that have been added at the respective nodes. Since this project actually aims to quantify the value of water that has

been used while moving the initial tonne of raisins along the chain towards the end consumer, the flow of exported raisins downstream from the point where they cross the border of the importing country is not considered. The final value of the initial tonne of Thompson's Seedless raisins that were produced on the commercial farm is R26 728.

Now that the value of the initial tonne of raisins is known, one can investigate the value of water that is used to get the raisins along the value chain from the input suppliers to the final consumer. The investigation of the value of water is discussed next.

4.6.3 DISTRIBUTION OF WATER USE AT CRITICAL POINTS ALONG THE VALUE CHAIN

The map of the flow of the raisins shows the nodes where value adding activities take place within the raisin value chain. The preliminary value chain map was updated in the previous section by adding the value of the physical product. In this section, the value chain map will be updated by adding the volumes of water used at the respective nodes in order to get an understanding of the water use along the channel. Ultimately it will also be used to calculate the value of water as the raisins move along the chain, to get an understanding of the way the value increases at the respective nodes.

Mapping the volume of water that is used along the value chain for raisins proves to be a major challenge. None of the farmers who were interviewed measure the amount of water that they use. All the farmers in the study area use flood irrigation with the water being distributed by a canal network. Farmers open a sluice to get water and thus don't have to pump the water at all. Moreover, the sluices are such that it is impossible to measure the volume of water that flows through the sluice. Discussions with DWAF and a number of chairpersons of irrigation boards in the region resulted in the same response – no one measures the amount of water that they use. They argued that the best estimate that can be used as the amount of water that is used to produce grapes is the 15 000 m^3 of water that is allocated per hectare of enlisted irrigable land in the region. There is, however, no evidence that farmers use only the 15 000 m^3 of water that is allocated to them, but similarly, there is also no evidence that farmers use more than that.

Water use was elicited by asking the respondents the number of times they irrigate their grapes. There is substantial variation in the number of irrigations per season, ranging from nine irrigations to 33 irrigations per season. According to Myburgh (2005), flood irrigation ranges between 750 m^3 to 1 000 m^3 per application. When assuming 750 m^3 per application, the volumes of irrigation water applied range from 6 750 m^3 to 24 750 m^3 for the whole season. The average amounts to 14 212 m^3, which closely resembles the recommended volume of 15 000 m^3. The variation in the volumes of water applied suggests that overall the farmers are not sure how much water is sufficient to produce a good crop of raisins. Given that the average volume of irrigation water applied resembles the recommended volume of 15 000 m^3, a volume of

15 000 m^3 is used for the purpose of mapping the water use along the chain. Figure 4.21 shows the distribution of water use along the value chain.

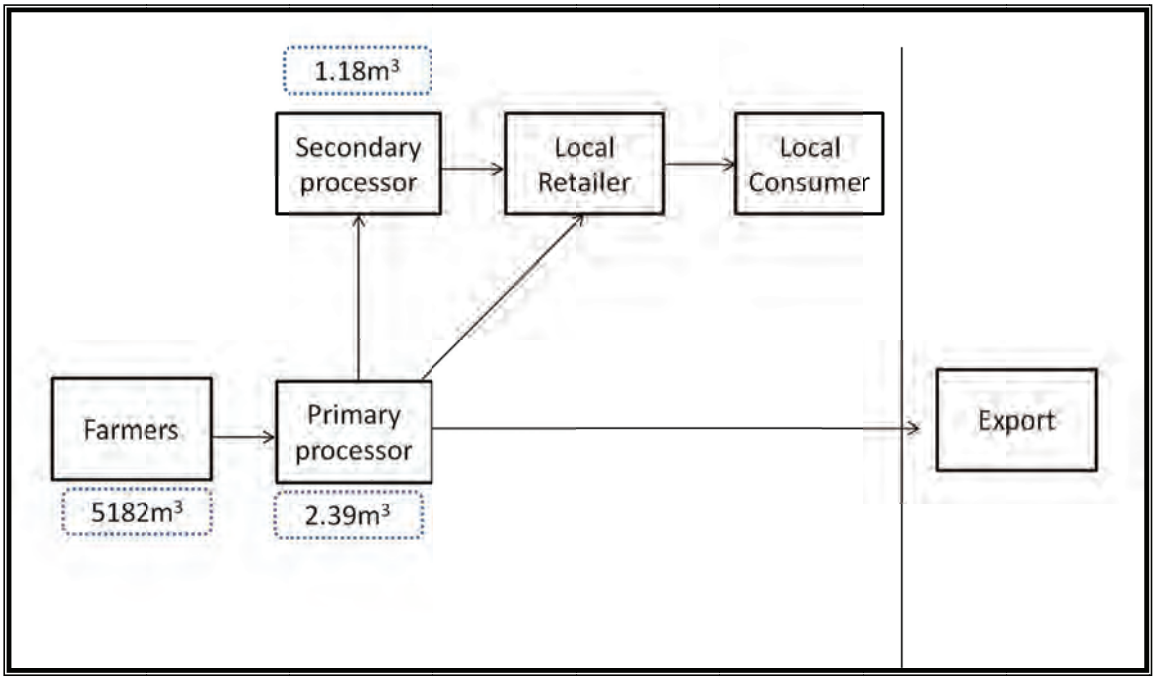

Figure 4. 21: Volumes of water (m^3) used to put one tonne of raisins produced by Eksteenskuil farmers through the respective nodes of the value chain.

Source: Own calculations from discussions with key role-players within the raisin industry

The average yield for Thompson's Seedless raisins at Eksteenskuil is about 2.9 tonnes per hectare. Assuming that farmers apply 15 000 m^3 of water per hectare to their grapes, the volume of irrigation water applied to produce one tonne of Thompson's Seedless raisins at Eksteenskuil amounts to 5 182 m^3 (Figure 4.21). It is noted that, although there are a number of different types of raisins that can be produced from sultanas, it is the exact same grapes that are only dried differently to become the different types of raisins. It thus can be assumed that the same amount of water is used to produce the different types of raisins.

The volume of water that is used at the primary processing node is somewhat easier to obtain since processing plants do not use raw water from the river for the processing activity. Most of them use municipal water and get charged per volume of water used. None of the processing plants, however, are that keen to reveal such information. Only SAD has replied. Since SAD processes more than 50% of the raisins produced along the Orange River, its water use is used as the volume of water per tonne of raisin processed. SAD used 48 728 m^3 of water to process 20 422 tonnes of raisins of the 2009 harvest. SAD thus used 2.39 m^3 of water to process one tonne of raisins. The water, however, is not consumed by the processing activity. The water is used to wash the raisins after which the used water is pumped into evaporation plots where it

returns to the hydrological cycle. Since the water is not available for use directly after it is pumped into the evaporation plots, the water use by the primary processors is considered to be consumptive use.

Again the different types of raisins go through the same processing, hence the volume of water to process one tonne of raisins is the same for the different types of raisins. The processing of both Thompson's Seedless and Golden raisins thus require a volume of 2.39 m^3 of water per tonne. Compared to the 15 000 m^3 of water that is used by the farmers, the water use within the primary processing node is only marginal.

The next node within the value chain is the secondary processors. Only 20% of raisins get onto the shelves as raisins (Koch, 2009; and Laubscher, 2009) while a large proportion of raisins is used as ingredients in the bakery industry. The actual amount of water that is used to get a tonne of raisins through the secondary processing node is thus again not directly observable. Raisins are widely used as ingredients in cake mix, cereals, muesli, rusks, snacks, biscuits, and breads, amongst others. Obtaining the volume of water to put one tonne of raisins through the secondary processing industry is thus a challenge. In order to get the volume of water at the secondary processing node, discussions were held with role players involved in using raisins when baking bread, fruit cakes, etc. Water requirements were also identified from recipe books.

Based on the amounts of water required for baking raisin breads and fruit cakes, 1 180 ml of water is required when using 1 kg of raisins to bake raisin breads and fruit cakes. One tonne of raisins used in the baking industry are thus used in combination with 1.18 m^3 of water. Again, the water use at the secondary processing node is only marginal. The total volume of water that is used to produce raisins and to deliver the raisins to the end consumer (in whatever form) thus adds up to about 5 186 m^3. In excess of 99.9% of the water that is used to deliver the final product to the end consumer is thus used on the farm. The heavily skewed distribution of water use emphasises the need to focus on the farm level when aiming to optimise the volume of water used to produce raisins and other raisin products.

4.6.3.1 Distribution of the value of water as the raisins move along the value chain towards the end consumer

Since value is added to the raisins at each of the nodes along the value chain, the value of the water that was used to produce the raisins also increase as the raisins move along the chain. Table 4.6 shows the value of the water at each node.

Table 4.6: Cumulative value added (in 2011 prices) to the raisins produced at Eksteenskuil as they move along the value chain from the farm to end buyer.

	Cumulative value added per cubic meter of water used (R/m^3)	
	Golden	Thompson's[1]
Farm	1.94[2]	1.58[2]
Primary processor		
- secondary processor (Industrial grade)	1.71	1.71
- export (Choice grade)	4.00[4]	4.00[3]
Secondary processor (Industrial grade)	8.66	8.66

Notes:

1: Thompson's Seedless raisins are exported via the fair-trade initiative.

2: Value of water at the farm level is expressed as the gross margin per cubic meter of water used to produce a ton of raisins.

3: Fair-trade price received for choice grade raisins that are exported via the fair-trade initiative.

4: Export price for golden raisins that are exported via the normal export market.

In Table 4.6, the value of the water at farm level is expressed as the gross margin per cubic meter of water used. The measure relates to the residual cost of water, except for the residual cost for water that also subtracts the opportunity cost of own resources that were used. Given that the gross margin for one tonne of Thompson's Seedless raisins produced at Eksteenskuil is R8 226/tonne, and 5 182 m^3 of water is used to produce one tonne of Thompson's Seedless raisins, the gross margin per cubic meter of water used on the farm is R1.58/m^3. The production of Golden raisins require the same volume of water, but the gross margin for the golden raisins is substantially higher at R10 064/ton compared to the Thompson's Seedless raisins. The higher gross margin causes the value of the water to produce golden raisins to be substantially higher than the value associated with Thompson's Seedless raisins, at R1.94/m^3. At farm level, these values suggest that using water to produce golden raisins is more efficient than using water to produce Thompson's Seedless.

When moving downstream from the primary processor there are two routes the raisins can follow on its way to the final buyer. Choice grade raisins are exported, while industrial grade raisins are sold to secondary processors. Since the primary processor use 2.39 m^3 of water regardless of the type of raisins, the total volume of water that had been used by the time the raisins leave the primary processor adds up to 5 184.39 m^3. Given the total value added when the Thompson's Seedless raisins are exported, the cumulative value added per cubic meter of water is R4.00/m^3. Similarly, the cumulative value added per cubic meter of water used to produce and export golden raisins adds up to R4.00/m^3. Due to the higher price via the fair-trade initiative, the value per cubic meter of water used for Thompson's Seedless is the same than for golden raisins. When the industrial grade raisins reach the secondary processor, the cumulative value that is added per cubic meter of water amounts to R1.71/m^3, both for

Thompson's Seedless and golden raisins. The reason for the same value of water for Thompson's Seedless and golden raisins is that there is no distinction in the price for industrial grade of the two types of raisins.

Similar to the different types of industrial grade raisins at the primary processing node, the secondary processors too do not differentiate in the prices for the two types of raisins. The secondary processors use some water (1.18 m^3 of water per ton of raisins) in combination with raisins and other ingredients to produce baked products. The total volume of water that was used along the chain when the raisin product leaves the secondary processor thus adds up to 5 185.57 m^3. The cumulative value added per cubic meter of water that has been used by the time the raisins leave the secondary processing node is R8.66/m^3 (both for Thompson's Seedless and golden raisins).

Overall, when comparing water use and value added for the raisins that are exported and the raisins that are used as ingredients in the bakery industry, it is evident that the cumulative value added per cubic meter of water is the highest for both Thompson's Seedless and golden raisins used as ingredients in the bakery industry. By implication, the water productivity is higher for raisins marketed through secondary processors compared to exported raisins. Interestingly, this situation holds even though the fair-trade initiative pays a fair price which is higher than the international price for choice grade raisins. By the time the industrial grade raisins leave the farm the farmers earn only R2 000/tonne compared to the R13 480/tonne for the choice grade Thompson's Seedless raisins and R18 480/tonne for choice grade golden raisins that are exported. Similarly, the value of the water by the time the raisins leave the farm is also higher for the exported raisins compared to the raisins for secondary processing. Assuming that the idea behind providing emerging farmers with irrigation water is to improve their livelihoods, producing raisins for the export market is the optimal allocation of water.

Moreover, compared to Thompson's Seedless raisins, the production and export of golden raisins are associated with higher returns both to the farmers and per cubic meter of water used (R1.58/m^3 for Thompson's Seedless vs. R1.94/m^3 for golden raisins) as the raisins leave the farm. At the farm gate there is thus evidence that the production of golden raisins is more efficient in terms of value added and the value added per cubic meter of water that was used. The production of golden raisins, however, requires trays at a cost of R108 per tray. According to Ehlers (2009) about 320 trays are required per hectare of golden raisins. The production of golden raisins thus requires an additional capital outlay in excess of R34 000 per hectare. Given that the raisin producers from Eksteenskuil are already constrained by limited cash flow, only a few of the farmers have actually invested in the trays to produce golden raisins.

If the aim of providing emerging farmers with irrigation water, however, is to maximise the return per cubic meter of water that has been used, it may be argued that the raisins should rather be

marketed through secondary processors as ingredients in the bakery industry. The ultimate goal for supplying emerging farmers with irrigation water thus has a major impact on the efficient allocation of the water.

The discussion of the optimal use of water based on the returns per cubic meter of water applied concludes this section. Evident from the above discussion is that by far the most water is used within the production node of the value chain. In order to optimise water use, emphasis should be placed upon optimising water use at farm level.

4.6.4 VALUE CHAIN INFLUENCERS AND SUPPORTERS

At this stage we have a very good understanding of the flow of the physical product along the chain from the input suppliers to the end consumer, the distribution of value as the raisins move along the chain, and the amounts of water used, and increase in the value of water used at the respective nodes along the chain. It is recognised, however, that the actors who are directly involved with the physical product (value chain players) do not operate in isolation (Roduner, 2005). At a macro level, those actors are also influenced by the rules and regulations (value chain influencers) that have to be met when participating in a specific value chain. At a meso level, the value chain players then also have support structures (value chain supporters) that support the value chain players to meet the requirements specified by the value chain influencers. In this section the value chain within which the farmers from Eksteenskuil are operating is assessed in terms of the value chain influencers and value chain supporters to get a more holistic view of the functioning of the value chain under consideration.

4.6.4.1 Value chain influencers (Macro level)

The value chain influencers represent all the rules and regulations that determine how the value chain will develop. As mentioned in the discussion of the institutional environment, the FLO standards are probably the most important influencer that determines how farmers from Eksteenskuil operate at the production level. The main reason is that FLO determines the criteria that must be satisfied in order for the farmers to participate in the Fair-trade value chain. The benefit to being a fair-trade producer is that you not only receive a fair price for your produce, you also receive an extra amount called a Fair-trade Premium that has to be spent in a certain way.

FLO's basic guidelines for premium spending are:

- Decide democratically about the use of the premium;
- Decide on a management body;
- Make a yearly premium work plan;
- Be transparent;

- Document the premium use.

In order to achieve the criteria above, it is clear that the farmers need to be well organised with good administrative capacity to document the premium use and the decisions that govern the use of the premium. Thus, once accreditation is achieved it might be possible to lose their status as fair-trade producers. Eksteenskuil farmers have organised themselves into a co-operative to participate in the fair-trade value chain and therefore the FLO standards also have a direct influence on the activities of EAC. Apart from the FLO standards SAD also have their rules and regulations that an individual farmers needs to adhere to in order to sell his produce to SAD. FLO also influences other actors in the value chain, such as SAD, in terms of traceability, quality assurance and packaging requirements.

4.6.4.2 Value chain supporters (Meso level)

In order to operate efficiently in the value chain, the actors in the chain need to have appropriate support. The farmers receive support from several institutions. EAC provides a means to provide technology transfer actions to the farmers by SAD, Traidcraft and the ARC. Due to problems with title deeds, farmers experience problems with obtaining production loans. Previously, SAD provided production loans to farmers, but this was stopped when Pioneer Foods took over SAD. Since then, the EAC has taken the opportunity to provide production loans to their farmers and to distribute necessary inputs in practical quantities to the small-scale farmers. However, EAC failed to source the necessary funds to allow them to provide individual farmers with production loans.

There is an interesting relationship between the farmers from Eksteenskuil and SAD. Figure 4.22 demonstrates the relationship between SAD and EAC to ensure that EAC receives the money back from the farmers. Since most of the farmers find it beneficial to sell their produce to SAD to participate in the fair-trade value chain, EAC has negotiated with SAD to handle the lien of EAC. The farmers sell their products to SAD, SAD pays the lien to EAC and the farmers are paid only the surplus. This relationship is unique in a sense that SAD only handles liens from EAC and no other entity.

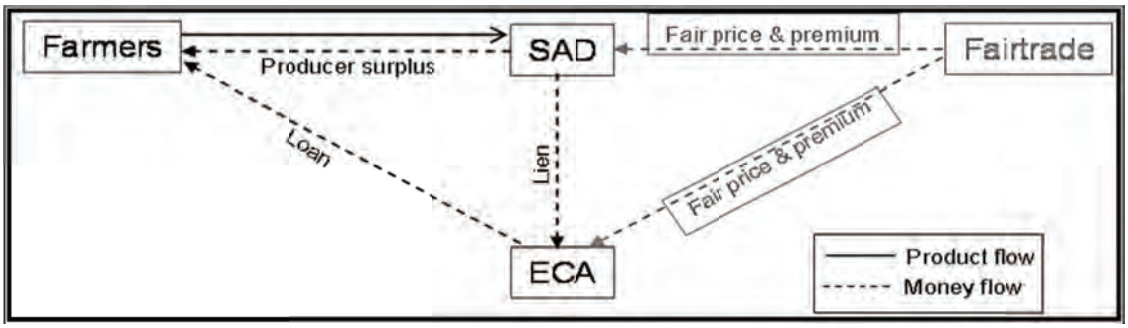

Figure 4. 22: Money flow map of production loans to Eksteenskuil raisin producers and repayments.

SAD further provides most of the extension services to the farmers from Eksteenskuil on the technical aspects of raisins production. At the moment they are busy setting up study groups and are helping EAC to update their land-use information. The ARC conducted a project on irrigation scheduling in the area. Today they are seen as the experts on irrigation scheduling by the farmers and information is provided to the farmers on an ad hoc basis.

Traidcraft was instrumental in developing the fair-trade value chain for the Eksteenskuil farmers association with SAD. SAD received assistance from FLO and Traidcraft to reorganise their processing is such that it fulfils the requirements set by FLO.

Thus, although there are a number of strict rules and regulations that have to be met by the farmers from Eksteenskuil who want to participate in the lucrative fair-trade value chain, there are support structures that assist them to meet the requirements. Especially SAD and Traidcraft do have an incentive to support the farmers from Eksteenskuil. Both parties have a vested interest in the performance of the farmers since they only benefit from the fair-trade initiative for the raisins that are produced by the farmers from Eksteenskuil that meet the requirements to be exported through the fair-trade initiative. Evidently, if the incentives are aligned correctly, the private sector is willing to support emerging farmers. It is noted that government played no role in establishing the supporting relationship between SAD and the farmers from Eksteenskuil. It is merely a result of incentives that were aligned such that SAD benefit only through the performance of the farmers from Eksteenskuil.

The case of Eksteenskuil also provides evidence that there may be merit in the question in NDP (2011) whether extension and other agricultural services are appropriately located at provincial level. The supporting role played by SAD, especially in terms of technical advice and support for the raisin producers from Eksteenskuil cannot be overlooked. Since the technical advisor from SAD already has the know-how for the production of raisins, the vested interest of SAD in the performance of the farmers from Eksteenskuil ensure that the technical advisor transfer the

necessary knowledge and advice to the farmers to produce maximum yields. It is important to note, however, that the level of effort from agro-processing companies to provide effective extension services depend very much on the incentive the company has. A vested interest in the performance of the emerging farmers may be sufficient to incentivise an agro-processing company to perform extension services. Government thus may be well advised to investigate ways that will give agro-processing companies a vested interest in the performance of the emerging farmers to incentivise them to perform the necessary extension services.

4.6.5 DISCUSSION

When moving to the value adding and water use along the value chain, some interesting findings were made. As expected, the value added to golden raisins is higher than the value added to the Thompson's Seedless raisins at the farm gate. The interesting finding is that substantially more value is added to the raisins that are moved through the secondary processing node where the raisins are used as ingredients in the baking industry compared to the raisins that are exported. The problem is that by far the smallest proportion of the value of the raisins through secondary processors is distributed to the farmers themselves. Thus, there proves to be a mismatch between the marketing alternative associated with the highest value added to the underlying raisins, and that marketing alternative that generates the highest return for the farmers to contribute to improving the livelihoods of the farmers. When adding water use to the situation, the same scenario is apparent. While the value added per cubic meter of water is by far the highest for raisins that are used as ingredients in the baking industry, the value of the water at farm gate is the highest for raisins that are exported via the fair-trade initiative. Depending on the reason for providing the raisin producers from Eksteenskuil with irrigation water, the optimal use of the water may differ. If the reason was to maximise the productivity of water (return per cubic meter), then one would conclude that the raisins should be moved through the secondary processing node en route to the end buyers. On the other hand, if the reason was to improve the livelihood of the farmers at Eksteenskuil, the optimal use of the irrigation water would be to apply the water to produce as many choice grade raisins as possible to be exported under the fair-trade initiative. Before interpreting the optimal allocation of water it is thus crucially important to clarify the reason for supplying the farmers with irrigation water.

Ultimately, it is evident that the value of the water that was allocated to the farmers is influenced by the performance of the farmers. The more income they generate from the crop they produce using the irrigation water, the higher the value of the water that has been used. Although the farmers from Eksteenskuil do participate in a highly profitable niche market, there still are a number of challenges they face that constrain their performance and hence negatively affect the value of the water that was allocated to them. In the next section the stumbling blocks are assessed, followed by a discussion of some leverage points that may be exploited to enhance the performance of the farmers from Eksteenskuil.

4.7 ANALYSIS OF CRITICAL POINTS IN THE VALUE CHAIN

Eksteenskuil raisin producers do not operate within the exact same value chain as other raisin producers (non-members of EAC) in the area. They operate in a niche market that was created by the fair-trade initiative. Although the fair-trade initiative allows Eksteenskuil raisin producers to earn a higher than market price fair price and a social premium, there still are some stumbling blocks that, if overcome, may lead to Eksteenskuil producers benefiting even more. The aim of this section is to conduct a problem tree analysis to investigate the stumbling blocks that constrain Eksteenskuil raisin producers' performance within the value chain. For the purpose of the analysis, a distinction is made between the production sub-decision making unit (Sub-DMU 1) and a marketing sub-decision making unit (Sub-DMU 2). Production and marketing are the two main activities performed by Eksteenskuil raisin producers. Since the aim is to identify stumbling blocks that directly affect the performance of Eksteenskuil raisin producers, the focus of the analysis is on the major activities performed by the farmers.

4.7.1 PROBLEM TREE ANALYSIS OF PRODUCTION SUB-DECISION MAKING UNIT

Based on discussions with key role-players, the major problem facing the community of Eksteenskuil raisin producers is their inability to produce sufficient volumes of good quality raisins to meet the demand for fair-trade raisins. The findings from the SCP analysis confirm the concern of the role-players. A problem tree analysis is conducted to investigate the factors that constrain the volume of raisins produced. A problem tree allows one to analyse the major problems and their causal relationships. Figure 4.29 shows the problem tree for the problem of Eksteenskuil raisin producers' not being able to produce a sufficient volume of choice grade raisins to meet the demand for fair-trade raisins. The problem tree was compiled based on discussions with the key role-players mentioned earlier, as well as from information obtained from the questionnaire survey.

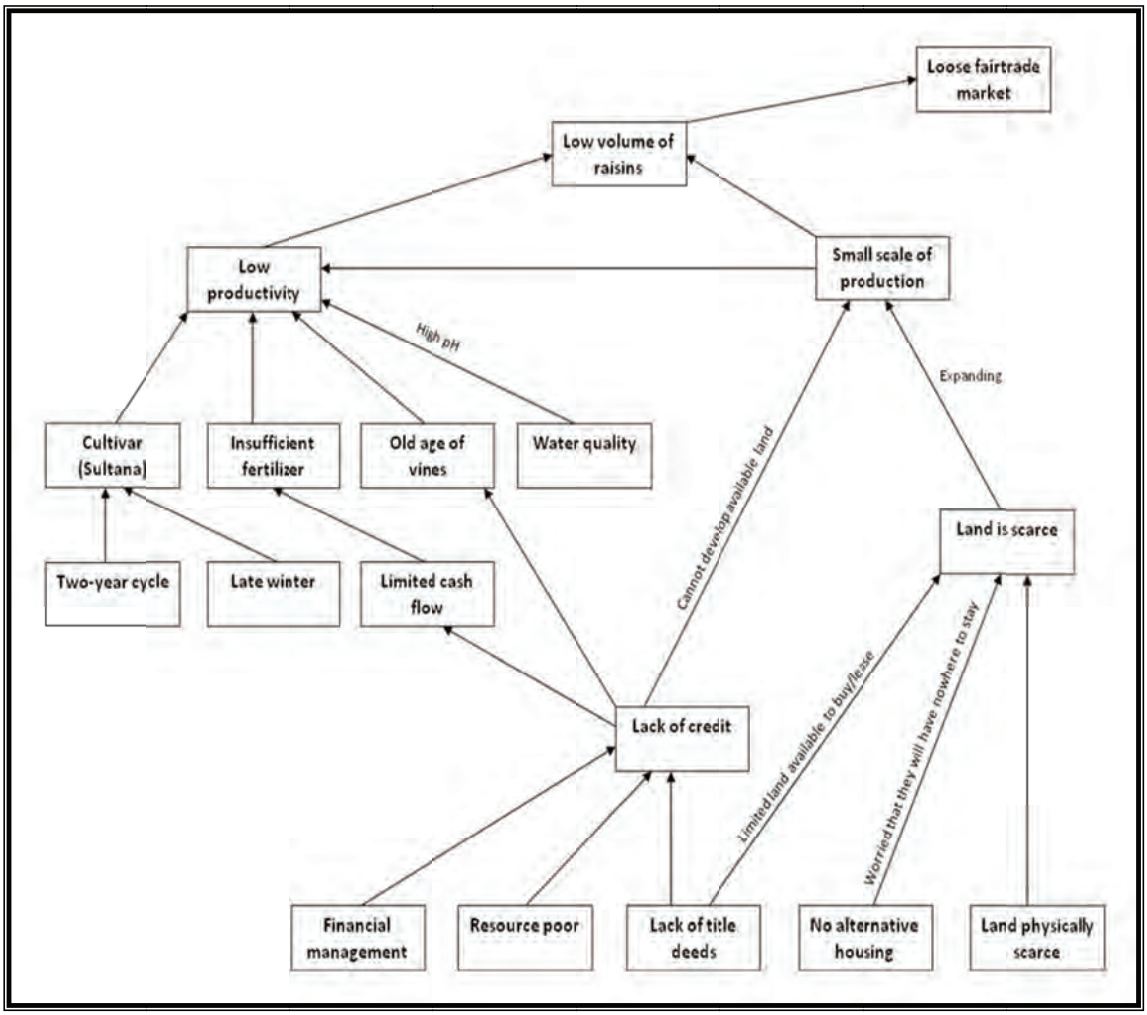

Figure 4. 23: Problem tree to investigate low volumes of raisins produced by Eksteenskuil raisin producers.

Figure 4.23 shows that there are mainly two causes for the low volumes of raisins produced by Eksteenskuil raisin producers; the scale of operations is too small; and the general level of efficiency of raisin production by Eksteenskuil producers is insufficient.

With regard to the small scale of operations at Eksteenskuil, the average size of farms at Eksteenskuil is about 3.8 hectares, ranging from 0.5 hectares to 46 hectares per farmer. It is noted that the average size is inflated by a group of five farmers who collectively farm on the 46 hectares of land. More importantly, 61% of the respondents farm on land smaller than three hectares with the median being only two hectares. The scale of operations is thus small and relates very much to the typical case of emerging farmers in South Africa.

Discussions with key role-players identified some causes for the problem of small land sizes (Figure 4.23). First of all there is only a **limited** amount of additional **land** that is **available** for raisin production in the area. The scarcity of land again has three major causes. There **physically** is not enough land available to allow all farmers to increase their scale of production.

Secondly, progressive farmers who want to increase their scale of operations by buying or renting additional land from other farmers struggle to do so since most of the farmers in the area do not have the **title deeds** for their land. Those farmers who do not have the title deeds cannot legally sell or rent out their land, even if they do not want to farm any more. The inability of non-title deed holders to sell or lease (part of) their land to progressive farmers constrains progressive farmers from increasing their scale of production in order to benefit from economies of scale. The third factor that leads to the limited amount of available land is the fact that Eksteenskuil farmers also **reside on their farms**. It was mentioned that some farmers are reluctant to sell or rent out their land since they do not have another place to stay.

The lack of available land is not the only cause of the small scale of operations at Eksteenskuil. Some farmers indicated that, although they do have some land available to establish vines, they do not have **access to credit** and hence they cannot financially afford the establishment of more vines. The cost of establishing one hectare of vines for dried grapes is in the region of R108 000/ha (Vinpro, 2009; Laubscher, 2009). The lack of access to credit, again, is caused, amongst others, by the fact that most of the farmers at Eksteenskuil do not have the **title deeds** for their land. Farmers who do not have the title deeds for their land cannot use the land as collateral for obtaining commercial credit. Farmers at Eksteenskuil typically can be considered to be **resource-poor**. Those farmers who do not have title deeds for their land and who do not have substantial off-farm income typically also do not have other assets that can serve as collateral for commercial credit. Such farmers cannot obtain credit to finance the establishment of grape vines. The last cause for the lack of access to credit was identified from a discussion with the SME Manager of ABSA Bank in the Free State Province. The manager argued that commercial banks would be willing to give credit to emerging farmers if the farmers have sound business plans to show how they will be able to repay the loans. The **lack of proper financial management** thus also causes the lack of access to credit.

As the second main cause for the low levels of raisins produced by Eksteenskuil raisin producers, the low level of efficiency with which they use their available resources too has a number of causes. First of all, in addition to having a direct impact on the low volume of raisins produced by Eksteenskuil raisin producers, the **small scale of production** also negatively affects the level of efficiency with which resources are used. The small scale of operations means that the vast majority of Eksteenskuil producers operate at diseconomies of scale. They need to increase their scale of operations in order to benefit from scale advantages.

Another cause of the low level of efficiency as identified by key role-players is the poor **quality** of the irrigation **water**. According to Baard (2009), the quality of the water has a major impact on the effectiveness of fertilisers and chemicals (pesticides and herbicides). An increase in the pH of the water negatively affects the level of efficiency of the applied fertilisers and chemicals. One of the commercial farmers in the region mentioned that he tested the pH of the water (on 12

August 2009) and found it to be 9.5 instead of the normal about 5. He was very concerned about the quality of the water. Similarly, 49% of the respondents at Eksteenskuil listed the poor water quality as a threat to their operations.

The low level of efficiency is further caused by the fact that some farmers apply **fertiliser** at lower than the recommended levels (or they do not apply any fertiliser at all), and some farmers also tend to apply fertiliser later than the recommended application dates. According to Baard (2009), the timely application of fertiliser to vines is of the utmost importance. If it is not applied in time, the level of efficiency drops substantially. The main reason why farmers do not apply sufficient amounts of fertiliser in time relates to their poor cash flow positions. Similar to other emerging farmers, most Eksteenskuil farmers face a severe cash flow constraint. The main cause of the cash flow constraint is the lack of **access to credit**. As mentioned above, most of the Eksteenskuil farmers do not have access to credit since they do not have the title deeds for their land, and they do not own other assets that may serve as collateral for commercial credit providers. Most farmers also do not have written business plans and complete financial statements that can prove to credit providers that they will be able to repay loans. Interestingly, the lack of cash flow is further exacerbated by the low volume of raisins (the major problem) that is produced at Eksteenskuil. The small land sizes imply that farmers can generate a relatively low amount of net farm income.

Although the potential profit of golden raisins is substantially higher than that for Thompson's Seedless raisins, few (only five) Eksteenskuil farmers are producing golden raisins. Compared to Thompson's Seedless raisins that are sun dried on cement slabs, the process to produce golden raisins requires wooden trays on which grapes are placed to be smoked with sulphur. Again, the lack of access to credit prohibits the majority of Eksteenskuil farmers from buying the required trays in order to produce golden raisins. They thus have to settle with producing the lower income generating Thompson's Seedless raisins.

When the potential profit for Thompson's Seedless of R37 534/ha is considered, the profit for the median size farm can be R75 068. Keeping in mind that the average household at Eksteenskuil consists of 4.22 family members (Kruger, 2010), two hectares of optimally produced Thompson's Seedless raisins may struggle to cover the living expenditures of Eksteenskuil farmers. The limited cash flow thus contributes to low volumes of raisins which again contribute to limited cash flow. It is thus a cycle that feeds on itself to constrain the performance of Eksteenskuil raisin producers.

Inefficient production practices are also caused by the **old age** of vines at Eksteenskuil. The economic life of Sultanas is in the region of 25 years (Brink, 2009; Kok, 2009; Laubscher, 2009; and Roberts, 2009). A number of respondents indicated that their vines are in excess of 35 years of age. The old age of the vines lead to progressively smaller yields and hence

progressively lower profits. Again, the inability to obtain **credit** implies that farmers cannot finance the re-establishment of vines. Keep in mind that grapes cannot be harvested within the first four years after planting. Farmers will thus need funds to finance the re-establishment of vines, and to cover living expenditures during the period when they cannot harvest.

The last cause for the low level of efficiency is the grape variety that is used to produce raisins. Farmers at Eksteenskuil mainly produce **Sultana** grapes which are known to have substantial variations in yields from one year to the next. As a matter of fact, Sultanas are known to be high yielding every second year and low yielding the other year (Brink, 2009; Kok, 2009; Laubscher, 2009; and Roberts, 2009). The **nature of the Sultana variety** thus contributes to the low level of efficiency of Eksteenskuil raisin producers in certain years. In addition to the huge variations in yields, Sultanas also start to blossom relatively early in September. **Extreme cold** during the blossom stage has a major negative impact on the yield to be obtained. Farmers have indicated that such periods of late cold occur more frequently in recent years and attributed it to the phenomenon of climate change.

From the above discussion it is clear that there are a number of stumbling blocks that cause the low volume of raisins that are produced by Eksteenskuil raisin producers. The stumbling blocks that were identified by means of the problem tree analysis correspond very much to the stumbling blocks that were identified in the literature review on the factors that contribute to excluding emerging farmers from participating in commercial agri-food chains. The problem tree analysis thus shows that the farmers from Eksteenskuil still face the same problems as other emerging farmers, but they are more successful in overcoming/managing the challenges to be able to participate successfully in the fair-trade market. Although some of those stumbling blocks are external and cannot easily be overcome, there are some that can be used as leverage points to assist Eksteenskuil farmers to increase the volume of raisins they produce. Some of those leverage points are discussed next.

4.7.2 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING RAISIN PRODUCTION

The low volumes of raisins that are produced by Eksteenskuil farmers is caused by the fact that the scale of operations is too small, and the level of efficiency with which inputs are used is insufficient. From Figure 4.23, the lack of access to credit seems to be central to most of the factors that cause low volumes of raisins. The lack of access to credit means that farmers cannot develop land that is already available to them for the production of grapevines; farmers cannot replace their old vines with younger, more productive vines, or with other varieties that are less exposed to yield variations and the problems associated with the late cold; and they do not have the necessary cash flow to ensure the timely and sufficient application of fertiliser and other production inputs. The lack of access to credit thus contributes directly to the two main

causes of low production volumes discussed above. Overcoming the credit constraint is thus a stumbling block that should be investigated for opportunities to be used as a leverage point to increase the performance of Eksteenskuil raisin producers.

Figure 4.23 shows that there are a number of causes for the lack of access to credit. The reason most often mentioned by farmers and other role players is the fact that most farmers do not have the title deeds for their land. As a matter of fact, less than 30% of the respondents to the survey indicated that they do have title deeds for their land. More than 70% of the respondents thus cannot use their land as collateral when sourcing commercial credit. The lack of title deeds also means that prosperous farmers cannot expand their production activities by buying or leasing additional land to benefit from economies of scale. The lack of title deeds in the case of Eksteenskuil is an institutional constraint which Eksteenskuil farmers cannot overcome on their own. It has to be noted that one of the plans in CRDP (2009) is to increase the pace of land tenure reform in order to make land tenure in rural areas more secure. Similarly, NDP (2011) also recommends the transfer of secure tenure to farmers in the rural areas in order to allow the agricultural sector to significantly contribute to meeting the vision for 2030. At the moment securing land tenure thus receives high level attention in government which suggests that there may possibly be good prospects that farmers may receive secure tenure for their land in the near future. However, the vehicle through which CRDP (2009) planned to increase the pace of tenure reform (CLARA) was declared invalid in its entirety by the Constitutional Court of South Africa in 2011. The true prospects of the remainder of farmers from Eksteenskuil receiving secure tenure in the near future thus remain to be questionable.

While transferring the title deeds to the individual farmers will allow them to use their land as collateral when sourcing credit, it is important to note that using the land as collateral for credit exposes the Eksteenskuil farmers to the risk of losing their land in case of default. There may be some need to clearly explain to and educate farmers on the consequences of using land as collateral when sourcing credit.

Another cause for the lack of access to commercial credit is the lack of proper financial management by Eksteenskuil raisin producers. Compared to the lack of title deeds, proper financial management is within the control of Eksteenskuil producers themselves. Given that commercial credit providers would consider providing credit based on a sound business plan and proper financial statements, educating and training Eksteenskuil raisin producers in proper financial management is a major leverage point to improve the performance by the raisin producers at Eksteenskuil. EAC also identified training in financial management to be crucial in improving the performance of the individual farmers. EAC has contracted a consulting firm to provide such training to farmers as a Fair-trade Premium Project. While a number of farmers started the course, only a few successfully completed it. Reasons provided by the farmers for not participating or completing the course include the fact that they were afraid that they would

need to write a test after the sessions; and that they had to spend a lot of time in the sessions and doing homework before each session which they would rather spend focusing on production activities. Those reasons may be an indication that the farmers do not grasp the benefits of proper financial management. Modelling the financial impact of overcoming the credit constraint to show the potential impact of proper financial management may incentivise farmers to participate more eagerly in training sessions in financial management. It is important to note that the solution recommended in this leverage point complies with the recommendation in NDP (2011) to enhance the skills of rural communities through education and training. It is. However, it is recognised that it is not necessarily education and training *per se* that is the solution. Training should be specific to the needs of the farmers in terms of their day-to-day decision making on their farms.

Thus, there definitely are some leverage points to overcome the stumbling block of the lack of access to credit. In addition to giving Eksteenskuil farmers access to credit, transferring title deeds to individual farmers will allow those farmers who are not that interested in farming to sell/lease their land to the more progressive farmers who are looking for more land to cultivate. It thus may make some land available to allow progressive farmers to benefit from economies of scale.

As another cause for the scarcity of land, the fact that some of the farmers do not want to sell/lease their land since they are worried that they will have nowhere to stay, indicates the need for proper rental agreements. Such farmers may enter into an agreement with the renter/buyer of their land to rent the house on the farm if possible so that they can keep on staying there. Such an agreement, however, will need to give both parties secure rights with regard to occupying the land and occupying the house on the farm. Whenever those rights are not secure from the contract, such an agreement will most likely not be sustainable.

Based on the problem tree analysis to investigate the major causes of the problem faced by Eksteenskuil raisin producers to produce a sufficient volume of raisins to remain the preferred supplier of fair-trade raisins in the world, transferring the title deeds to individual farmers and training farmers in proper financial management seem to be potential leverage points to enhance the performance of Eksteenskuil raisin producers. Modelling the potential impacts of overcoming those constraints will give an indication of the potential benefits associated with overcoming the respective constraints. Evaluating the benefits and costs associated with overcoming the respective stumbling blocks will serve as a guide on where to start when assisting Eksteenskuil raisin producers overcome their constraints in order to enhance their performance.

4.7.3 PROBLEM TREE ANALYSIS OF MARKETING SUB-DECISION MAKING UNIT

Within the marketing sub-node, Eksteenskuil farmers face substantially less stumbling blocks compared to the stumbling blocks faced within the production sub-node. The reason is that they are operating in a sophisticated niche market by exporting their raisins through the fair-trade initiative. By participating in the niche market, they are receiving higher prices than other raisin producers in the area who are not allowed to participate in the niche market. The only stumbling block that they face is the fact that, although they are receiving higher prices than other raisin producers in the region, the income they generate still is insufficient to finance production activities and all of their household expenditures. A problem tree analysis is performed within the marketing sub-node to identify the causes for Eksteenskuil farmers not being able to generate sufficient income. Figure 4.24 is a schematic representation of the problem tree.

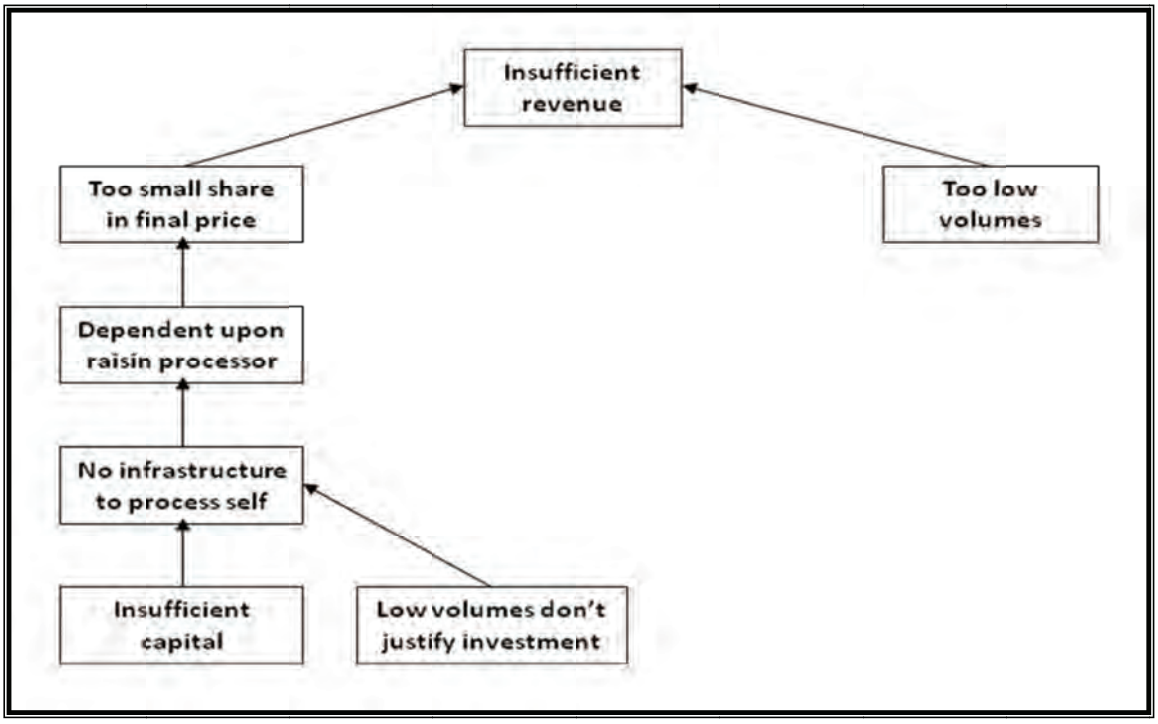

Figure 4. 24: Problem tree for marketing sub-node to investigate the reasons for insufficient revenue earned by Eksteenskuil raisin producers.

Figure 4.24 shows that there are mainly two causes for Eksteenskuil farmers not being able to generate sufficient income to finance production activities and all the household expenditures. The low volume of raisins that is produced probably is the major cause for the insufficient income. Since the causes for the low volume of raisins is extensively discussed above, it will not be discussed again in this section.

The second cause for insufficient revenue relates to the fact that Eksteenskuil farmers receive only a relatively small proportion of the final price for their raisins. The main reason for this is

their dependence upon a raisin processing company to clean and process the raisins to be used further downstream along the value chain. The primary processing of raisins requires sophisticated machinery and instruments to ensure that processed raisins meet international health and safety standards. Eksteenskuil raisin producers do not have the required infrastructure and sophisticated machinery to allow them to process their raisins themselves.

The reasons that Eksteenskuil farmers do not have the necessary infrastructure to process raisins again are twofold. Firstly, they do not have the required capital to erect a processing plant. Recall that raisin producers at Eksteenskuil are a group of emerging farmers with most of them being resource-poor. A processing plant with a capacity to process only 3 000 tonnes of raisins was recently built in the region at a cost of R60 million. The capital required for such a plant is thus substantial. Eksteenskuil raisin producers do not have sufficient capital to erect a processing plant. The second reason preventing Eksteenskuil producers from erecting a processing plant is the fact that the volumes of raisins they produce are too low to justify such a capital investment. Eksteenskuil farmers struggle to collectively produce 500 tonnes of raisins per year. Given that the processing capacity in their region is already about double the production capacity, there is strong competition to get raisins from producers in the area, which in turn has strong upward pressure on the prices to be paid for raisins. Moreover, they are not allowed to sell raisins produced by non-members of EAC through the fair-trade initiative, which means that they will not get the higher prices and the fair-trade premium for those raisins.

Although Eksteenskuil raisin producers are participating in a sophisticated value chain, there are some stumbling blocks that constrain their performance with regard to marketing their produce. Within the next section some potential leverage points are discussed to overcome the stumbling blocks.

4.7.4 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING RAISIN MARKETING

A problem associated with the niche market within which Eksteenskuil farmers operate is the fact that raisins are considered to be a luxury product. Periods of economic downturn (as was the case recently) negatively affect the demand for, and hence the price for fair-trade raisins. Being an export product, the income earned from fair-trade raisins also depends very much upon the exchange rate. Given the current scenario where the South African Rand is relatively strong against the other major currencies (Euro, US Dollar, etc.), the income that is earned from exporting the raisins is affected negatively. From the above section it is evident that the major stumbling block that constrains the marketing performance of Eksteenskuil raisins producers relates to their dependence upon raisin processors. Given the causes for being dependent upon the processors discussed above, it is understandable that overcoming that stumbling block would be a major challenge.

Given that Eksteenskuil farmers lack sufficient capital to erect a processing plant themselves, one way would be for government to contribute to the capital outlay associated with erecting a processing plant for Eksteenskuil. It is important, though, to realise that erecting the processing plant does not necessarily imply that the farmers would be able to efficiently process their raisins themselves. Operating a processing plant requires considerable skill and expertise. Such skill and expertise will need to be obtained. Although providing Eksteenskuil farmers with a processing plant may seem like a good option to allow them to earn a larger share of the final price, a thorough assessment of its feasibility is necessary before implementing such a project.

Given the challenge associated with erecting and managing a primary processing plant, an alternative solution may be to outsource the primary processing activity to a primary processing company, but then to vertically integrate into secondary processing where the raisins are mainly used as ingredients in the baking industry. The secondary processing of raisins requires substantially less capital compared to primary processing. It can be started at a relatively small scale and increase over time. Since women at Eksteenskuil are also more familiar with baking, they might be more suitable to be employed at the secondary processing node than in primary processing.

A major benefit of Eksteenskuil vertically integrating into secondary processing would be that the value that is added to raisins at the secondary processing node is substantially higher than that added at the primary processing node. Rather than selling an intermediary product, it would mean that they will be selling a final product. They could develop their own brand to sell their products under, rather than depending on the FLO label to survive financially. Secondary processing of their raisins would give the Eksteenskuil community a larger share of the final price of the raisins than would be the case if they only did the primary processing. Again, a thorough analysis is required as to the feasibility of vertically integrating into secondary processing. Such an analysis should also include a thorough investigation of the best business form that would allow the Eksteenskuil community to benefit financially from doing the secondary processing themselves.

From the above it is clear that, although Eksteenskuil raisin producers currently operate in a sophisticated niche market, there still are some leverage points to improve their performance with regard to the marketing of their raisins. Given their dependence upon raisin processors, and the challenges and risks associated with producing for the fair-trade market, the time is ripe for investigating the feasibility of them vertically integrating into the processing (primary and/or secondary) nodes in the value chain.

4.8 MODELLING POTENTIAL BENEFITS FROM INTERVENTIONS TO OVERCOME STUMBLING BLOCKS

More than 99% of all the water that is used to produce raisins, transforming it into the final product and delivering it to the consumer, is used at farm level. In order to optimise water use, it thus makes sense to focus on water use at farm level. While a previous section already quantified the value per cubic meter of water used to produce raisins, this section aims to optimise the net cash flow of the emerging farmers from Eksteenskuil as a means to optimise the value of the water they have used to produce raisins. Recall that the efficiency of water use at farm level is expressed as the gross margin per cubic meter of water used. Improving the cash flow in order to contribute to increasing the gross margin thus will have a direct impact on the value of the water, and hence on the efficiency associated with using the water for raisin production.

Before presenting the results from different scenarios that were modelled, the assumptions that underlie the optimisation model are discussed briefly next.

4.8.1 ASSUMPTIONS UNDERLYING THE CASH FLOW OPTIMISATION MODEL FOR THE CASE OF RAISIN PRODUCERS FROM EKSTEENSKUIL

In addition to the modifications to the cash flow model that were discussed in Chapter 3, another modification was made to the model, specifically for the case of Eksteenskuil. A parameter was added to represent the premium that Eksteenskuil producers receive for their choice grade raisins, exported via the fair-trade initiative. The inclusion of the parameter allows for modelling the potential impact on the net cash flow of the farmers if they were to lose their position in the fair-trade market. The poor performance of raisin producers from Eksteenskuil contributes substantially to the transaction costs faced by the fair-trade buyers, which creates incentives for such buyers rather to procure raisins from other producers. Newly FLO-accredited producers from Chile and India have the capacity to meet all of the demand for fair-trade raisins internationally. Consequently, there is a definite possibility that the farmers from Eksteenskuil may lose their market share and consequently will have to compete with other commercial farmers in the normal export market.

For the purpose of modelling the cash flow of raisin producers from Eksteenskuil some assumptions were made. It is assumed that:

- The cash flow model optimises the net cash flow for a period of one year.
- The year under consideration starts at the first of January.
- The price premium for choice grade raisins exported via the fair-trade initiative is 4% of the price.

- The farmers do not have access to overdraft facilities from the bank.
- The farmers do not have access to formal credit since they do not have credible credit records with formal lending institutions, nor do they have the title deeds for their land to allow them to use the land as collateral for obtaining credit.
- Farmers start the first period with R2 500 cash since they have to pay for all of their living expenditures and production inputs prior to the first harvest.
- On average, the living expenditure of raisin producers from Eksteenskuil is R1 750 per month. Given the median farm size of 3ha, the average living expenditure per hectare amounts to R583.
- Other income (i.e. grants, off farm economic activities, and income from other household members) add up to R350 per hectare per month.

4.8.2 RESULTS FROM CASH FLOW OPTIMISATION MODEL FOR RESPECTIVE SCENARIOS

For the purpose of this study, the base scenario is modelled, together with three different scenarios. The base scenario represents the current situation at Eksteenskuil. Given the potential to increase the levels of technical efficiency of the farmers in order to improve their performance, the first scenario that was modelled is a situation where the farmers use their production inputs in such a manner that all of them are operating on the frontier. By implication, Scenario 1 represents the case where farmers use their inputs in a technically efficient manner. The low levels of input use and the importance of the lack of access to credit as a cause for the production of low volumes of good quality raisins were the reasons for considering the second scenario. This is a situation where farmers do have access to credit and are able to increase their input use by 50%. Scenario 2 thus represents the situation where farmers have access to the necessary means to intensify their production activities. In the third scenario, the price premium that farmers from Eksteenskuil receive for exporting their raisins via the fair-trade initiative is removed to determine the degree to which the farmers are dependent on the premium they receive. Scenario 3 thus models the potential impact if the farmers from Eksteenskuil were to lose their market share in the fair-trade market. All scenarios are modelled in 2011 prices.

4.8.2.1 Base scenario

The base scenario represents the current situation at Eksteenskuil. In this scenario, the farmers are assumed to have a positive bank balance of R2 500 in order to be able to finance living expenditures prior to selling the raisins. The farmers receive a price premium of 4% for their choice grade raisins exported via the fair-trade initiative. The farmers are not allowed to have a negative bank balance at any time, and do not have access to any form of formal credit.

In the base scenario, four (11%) of the respondents generated negative net cash flows and were considered unfeasible. Twelve (32%) of the respondents generated negative gross margins, which means that they are unable to cover their direct allocatable costs. By implication, providing those farmers who generate negative gross margins with irrigation water actually made them worse off than they would have been if they didn't produce raisins. Given the base scenario, there seems to be evidence that supplying raisin producers from Eksteenskuil with irrigation does not necessarily contribute to alleviating poverty at Eksteenskuil. However, there are some farmers who do generate positive gross margins and hence benefit from using irrigation water. As a matter of fact, the average gross margin is positive. Similarly, the average net cash flow of the farmers (R12 481/ha) is also positive. Thus one may conclude that supplying irrigation water to Eksteenskuil farmers does benefit the farmers, even in the current situation.

Figure 4.25 shows a stoplight graph for the base scenario. The lower limit for the purpose of the graph is 0 in order to list all of the farmers who do not generate positive net cash flows under the red light. The upper limit is set to R16 037/ha, which is the estimated direct allocatable cost per hectare to produce Thompson's Seedless raisins. Respondents who generate net cash flows greater than R16 037/ha are able to finance 100% of the recommended input levels during the following season, and are listed under the green light. All respondents who generate net cash flows between the two limits are listed under the yellow light.

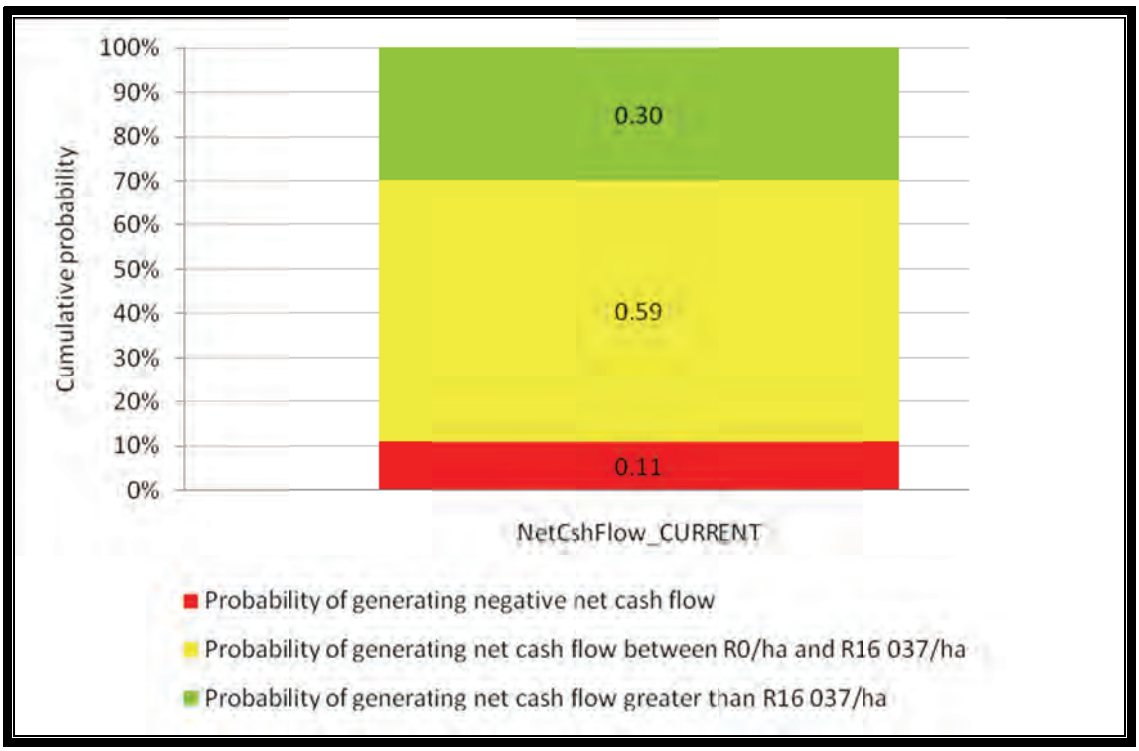

Figure 4. 25: Stoplight chart of the net cash flows (in 2011 prices) per hectare within the base scenario (Lower limit = 0, upper limit = 16 037).

Figure 4.25 shows that 11% of the respondents did not generate positive net cash flows over the year under consideration. On the other hand, 30% of the farmers generated sufficient net cash flow to be able to finance the application of the recommended input level during the next season.

4.8.2.2 Scenario 1 – Improving the level of technical efficiency of raisin producers from Eksteenskuil

The idea behind improving the levels of technical efficiency of the farmers means that the farmers have to produce on the frontier with their current input levels. Interestingly, when the farmers are modelled to produce at a technically efficient level, only two (5%) of the farmers are considered to be unfeasible (i.e. generate negative net cash flows). Moreover, except for these two, all of the respondents generate positive gross margins. If the farmers could be assisted to use their inputs in a technically efficient manner, the vast majority of the farmers will benefit from having access to irrigation water.

In addition to contributing to all farmers generating positive gross margins, becoming technically efficient has a potentially major positive impact on the generated net cash flow. As a matter of fact, the average net cash flow if all of the farmers used their inputs at a technically efficient level increased by 77% (from R12 481/ha to R22 107/ha). The substantial increase in the average net cash flow suggests that it may be worthwhile investing time and resources in assisting and supporting raisin producers from Eksteenskuil to use their inputs in a technically efficient manner.

A stoplight chart is drawn for the new scenario (Figure 4.26), and compared with the base scenario to get an idea of the benefit associated with Scenario 1 compared to the base scenario.

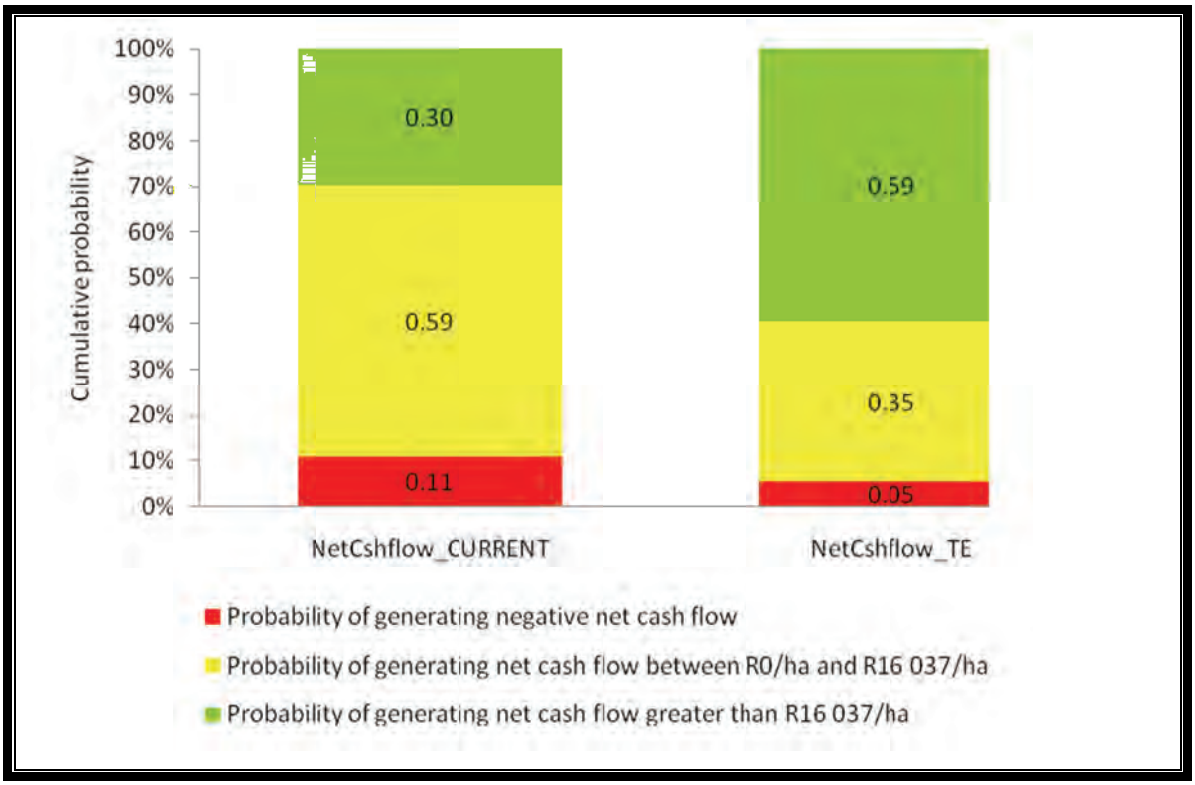

Figure 4. 26: Stoplight chart for the net cash flow (in 2011 prices) generated in the base line scenario and given an improvement in technical efficiency levels (Lower limit = 0, upper limit = 16 037).

Figure 4.26 shows that the probability of the respondents generating negative net cash flows decreased from 11% to 5%. On the other hand, the probability that the respondents would generate a sufficient positive net cash flow to be able to finance the recommended input levels increases substantially from 30% to 59%. The stoplight chart presented in Figure 4.26 thus provides more evidence of the potential benefits of improving the farmers' technical efficiency.

4.8.2.3 Scenario 2 – Give raisins producers from Eksteenskuil access to credit to allow them to intensify production by increasing input use by 50%

The median levels of nutrients (N, P and K) applied by raisin producers from Eksteenskuil is less than 30% of the recommended levels. During the interviews, farmers indicated that a lack of cash flow was the main reason for applying such low volumes of inputs. According to Baard (2009), the timely application of sufficient levels of fertiliser (including other sources of nutrients) is crucial to producing a high volume of good quality grapes. The second scenario to be modelled is a situation where the farmers from Eksteenskuil could intensify their production activities by releasing the constraints to their cash flow positions. More specifically, Scenario 2 is a situation where the farmers have access to formal credit in order to finance production inputs associated with an increase of 50% in input use from the base scenario. While the majority of farmers are operating at increasing returns to scale, their yields must increase by the

same proportion as their inputs (50%) in order to get a conservative estimate of the potential benefit associated with intensifying production.

One of the reasons why the farmers cannot get credit is the fact that they do not have the title deeds for their land and hence cannot use the land as collateral. Given that the government-initiated TRANCRAA process was already concluded in 2005 and it was recommended that the land should be transferred to the individual farmers, the fact that the land has not yet been transferred is an indication of institutional failure. Scenario 2 thus models the impact of correcting the current situation by transferring ownership of the land to the individual users.

Assuming that the farmers remain at the same levels of technical efficiency, the average net cash flow increases substantially by 55%, from R12 481/ha in the base scenario, to R19 397/ha. However, there still are three farmers who generate negative net cash flows, and another twelve who generate negative gross margins. If you apply Scenario 2 and you also get the farmers to use their inputs efficiently, the average net cash flow increases even further, to R34 030/ha (172%). Thus, while intensifying productivity will already benefit those farmers who are performing well under current circumstances, improving the levels of technical efficiency of the farmers combined with correcting the institutional failure would have a major positive impact on the net cash flow and hence the well-being of the farmers.

The stoplight chart for Scenario 2 compared with the base scenario is presented in Figure 4.27.

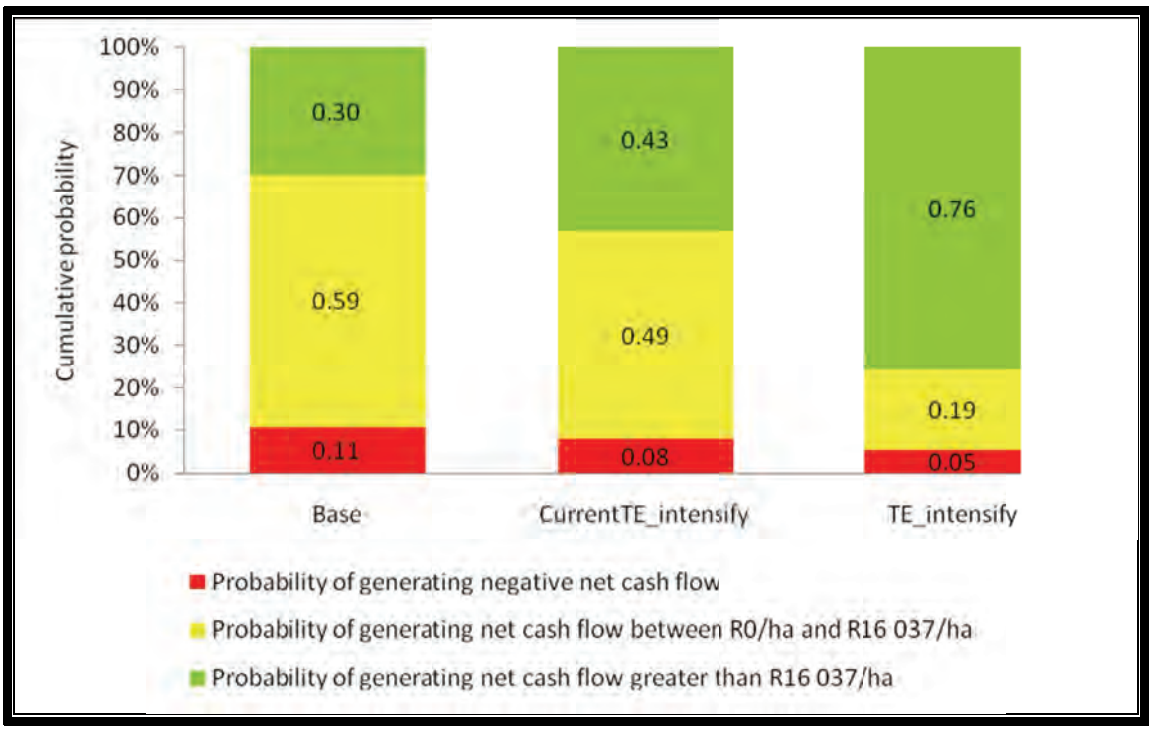

Figure 4. 27: Stoplight chart for base line and Scenario 2 where farmers have access to credit and intensified production with 50% (Lower limit = 0, upper limit = 16 037).

The results in Figure 4.27 show that, if the farmers could gain access to credit to finance a 50% increase in input levels, the probability of farmers generating negative net cash flows decreases from 11% to 8% under current levels of technical efficiency. On the other hand, if the farmers are allowed to intensify and they can also increase their levels of efficiency, the probability of generating a negative net cash flow decreases to 5%. The benefits of intensifying production are a greater ability to generate enough funds to finance the recommended levels of inputs for the next season, and the probability of this increases from 30% to 43% under current technical efficiency levels, and to 76% if the farmers are supported to use their inputs efficiently. Again the benefit is amplified if the farmers use their inputs efficiently.

4.8.2.4 Scenario 3 – Cancel the price premium Eksteenskuil currently receive for their choice grade raisins exported via the fair-trade initiative

The last scenario to be tested is what the impact would be on the Eksteenskuil raisin producers if they lose their market in the fair-trade market. Scenario 3 thus provides insight into their level of dependence on the price premium received through the fair-trade initiative. The more dependent the farmers are on receiving the premium, the higher the risk they face in losing the market.

Under current levels of technical efficiency, the average net cash flow decreased from R12 481/ha to R11 945/ha (4.3%) when the price premium is cancelled. As with the base scenario, the same 12 farmers are still generating negative gross margins, and the same four still generate negative net cash flows. Thus, although cancelling the price premium does result in a decrease in net cash flow, no additional farmers became unfeasible. The farmers thus prove not to be too dependent on the price premium they receive.

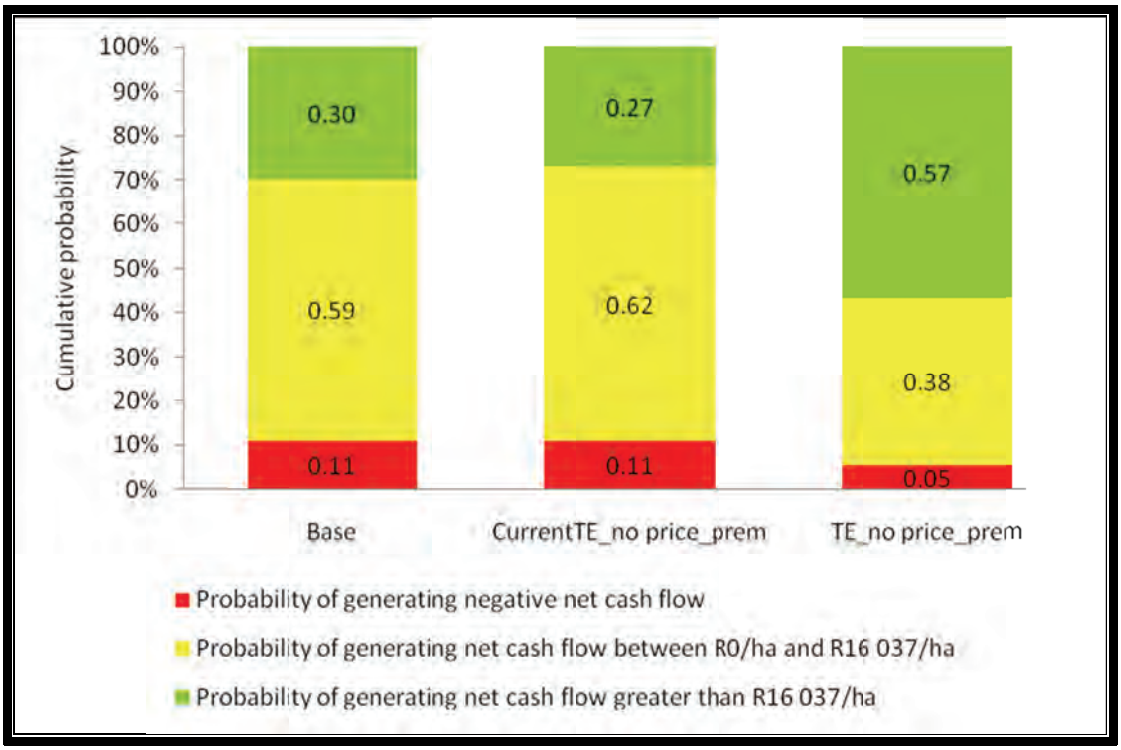

Figure 4. 28: Stoplight chart to compare base scenario with a scenario where Eksteenskuil farmers do not get the price premium for choice grade raisins (Lower limit = 0, upper limit = 16 037).

The stoplight chart in Figure 4.28 also shows marginal changes in the overall structure of the net cash flow positions of the farmers. Compared to the base scenario, the only change if farmers remain under the same levels of technical efficiency is that only 27% of the farmers will generate sufficient net cash flow to finance the recommended levels of inputs next year. If farmers are made to use their inputs efficiently, the probability of generating negative net cash flow decreases to 5%, while the probability of generating sufficient funds to finance the following years' recommended levels of input increases substantially to 57%. Thus, although the farmers prove not to be too dependent upon the fair-trade premium, if the farmers can be supported to use their inputs efficiently, they will still be better off than in the base scenario.

4.8.3 DISCUSSION

From the modelling of the cash flow of raisin producers from Eksteenskuil it is evident that the majority of farmers are functioning successfully in the current value chain. This success refers to the ability of the farmers to generate positive net cash flows by the end of the year. As a matter of fact, under the current conditions there are some farmers who generate sufficient net cash flow to be able to pay already for inputs at the recommended levels. If farmers are forced to use their inputs in a technically efficient manner, the average net cash flow increases by 77% (from R12 481/ha to R22 107/ha). The results thus provide evidence of the value of training and

supporting the farmers to use their inputs efficiently as recommended by CRDP (2009). As a matter of fact, the potential benefits of all of the modelled scenarios were substantially amplified under the condition that the farmers also use their inputs efficiently.

The best improvement in net cash flow based on the results from the optimisation model is associated with intensifying current production levels as recommended by Fanadzo *et al.* (2010). The farmers in the model were forced to increase their input levels by 50%. Although the raisins producers already were shown to operate at increasing returns to scale, an increase of only 50% in the yields were assumed to model the potential benefit of intensifying production. From the base scenario, the net cash flow under current levels of technical efficiency increased substantially, by 55% (from R12 481/ha to R19 397/ha). When the farmers were also forced to use their inputs efficiently, the average net cash flow increased even further, to R34 030/ha (172%). The above results emphasise the importance of supporting farmers to use their inputs efficiently, and to find ways to allow them to intensify current levels of production.

In the third scenario, the impact on net cash flow was modelled if the Eksteenskuil raisin producers were to lose their share in the fair-trade market due to the high transaction costs they cause for their buyers. Interestingly, the farmers prove not to be too dependent on the fair-trade price to generate positive net cash flows. In the absence of a fair-trade price, the farmers could actually outperform the current situation where they do receive the fair-trade price if they were able to use their inputs in a technically efficient manner. Ultimately, the results from the different scenarios suggest that the major benefit to the farmers relates to them intensifying their production activities and using their inputs efficiently. Support and training services should focus on educating farmers in terms of recommended input levels, and the efficient use of the recommended levels of production inputs. The results from the modelling of the respective scenarios for the case of Eksteenskuil provides evidence that government's strategy to focus on education and training of rural communities is a definite step in the right direction. Care should be taken to ensure that extension officers and other training agents are sufficiently capable to effectively transfer the necessary skills to the farmers to ensure that the maximum possible benefit is achieved. In this regard it may be worthwhile to investigate the prospects for incentivising agro-processing companies to contribute to the transfer of skills to local emerging farmers through their technical advisors. The technical advisors of agro-processing companies already do have the required knowledge and skills to educate the farmers. By doing this, government will reduce its responsibility to provide a sufficient number of capable extension officers that will be able to effectively support different groups of emerging farmers who want to participate in a variety of different sub-sectors.

CHAPTER 5

CASE STUDY – ZANYOKWE VEGETABLE PRODUCERS

5.1 INTRODUCTION

The aim of Chapter 5 is the application of the conceptual framework to the case of vegetable producers from Zanyokwe Irrigation Scheme (ZIS). The idea is to conduct a comprehensive assessment of the behaviour and performance of the farmers from ZIS to identify potential leverage points that can be used to improve the performance of the farmers. Improving their performance will have a positive impact on the value of the water allocated to them from ZIS with the aim to improve their livelihoods.

Chapter 5 starts with a brief description of ZIS to give some background to the study area, followed by a discussion of the activities through which data was collected for the purpose of analysis. Thereafter follows the results from the SCP analysis that was used to gain insight into the physical environment within which the farmers operate, the way they behave, and the level to which they currently perform. After the SCP analysis the NIE framework is applied to gain insight into the reasons why the farmers behave the way they do.

Once we have a comprehensive understanding of the reasons why the farmers behave the way they do, the value chain within which the farmers participate is assessed in terms of the distribution of value and water use among the respective nodes along the chain. Such an assessment will provide information on the level of efficiency with which water is used in terms of maximising the economic returns per unit of water that has been used to produce the product, and to deliver it to the end consumer.

After analysing the value chain, a problem tree analysis is conducted to investigate stumbling blocks that constrain the performance of the farmers, and potential leverage points that can be used to overcome the stumbling blocks. A cash flow optimisation model then is used to model the potential impact of the recommended strategies on the cash flow position, and hence the performance of the farmers from ZIS.

5.2 BACKGROUND TO ZANYOKWE IRRIGATION SCHEME

ZIS was initiated as a development project by the community and the government in an attempt to improve the standards of living and to create job opportunities. The former Ciskei government motivated the development of the Zanyokwe irrigation scheme in 1983 as a show piece in irrigation farming in the area (Rural Urban Consultants, 2001).

The scheme consists of six villages (Kamma Furrow, Burnshill, Lenye, Ngqumeya, Wolf River and Zanyokwe). Each village has its own registered co-operative, while the six co-operatives again are members of a secondary co-operative, Zanyokwe Central Agricultural Cooperative (ZCAC). The idea is that the farmers coordinate their production activities and then collectively market their produce through ZCAC.

The farmers from ZIS are mainly vegetable producers, however, some farmers also produce essential oils, paprika and potatoes. Except for those farmers who participate in the paprika project, individual farmers operate autonomously on their plots. There is an initiative, however, that aims at getting the farmers to coordinate their production and marketing activities to prevent them from competing with each other and consequently forcing down the prices they receive for their vegetables.

5.3 DATA COLLECTION

The study is based both on primary and secondary data. The primary data for the purpose of this study was obtained by means of a number of discussions with key role-players within the value chain within which the farmers operate, and a questionnaire survey that was conducted in November 2010.

The next section describes the procedures followed to develop the questionnaire that was used to capture primary data, followed by a discussion of the sampling procedure and the survey that was conducted. The section ends with a discussion of the characteristics of the respondents as obtained from the questionnaire survey.

5.3.1 DEVELOPMENT OF THE QUESTIONNAIRE

The questionnaire (see Appendix D) was used to gather, amongst others, socio-economic information, amounts of inputs used and output produced, marketing behaviour, information to quantify the transaction costs faced by Zanyokwe producers, and information to quantify their levels of social capital.

The same conceptual framework that was used to study the case of Eksteenskuil is also used to study the case of vegetable producers from ZIS. The theoretical content of the two questionnaires are thus similar. The questionnaire used to gather data at Eksteenskuil was adjusted to capture data specific to vegetable production and marketing at ZIS. The adjustments to the original questionnaire were based on numerous discussions with key role players at the ZIS. Once the questionnaire was compiled, it was discussed comprehensively with the extension officer and two of the prominent farmers in the ZIS. They were asked to be hyper-critical with regard to the understandability of the respective questions, and whether or not important information was omitted from the questionnaire. Based on their comments and suggestions some changes were made to questions before the questionnaire was considered acceptable.

A pilot survey was conducted where four of the farmers were personally interviewed to mimic the circumstances of the actual survey. The farmers again were asked to be hyper-critical with regard to their understanding of the questions. All four farmers understood the questions as they were intended, and hence the questionnaire was considered to be acceptable.

5.3.2 SAMPLE DESIGN

Due to expectations that the farmers do not keep sound production and financial records, and the fact that there are fewer than 60 farmers actively farming on ZIS (Mbengezi, 2009), it was decided to include the whole population of vegetable producers at ZIS in the sample for the purpose of analysis.

5.3.3 THE SURVEY

The survey was conducted by personally interviewing vegetable producers at the ZIS. Zanyokwe farmers are predominantly Xhosa speaking and a number of the farmers cannot understand English or Afrikaans at all. Consequently, two Xhosa speaking students were contracted as interviewers to assist with the survey. A comprehensive training session was held with all interviewers to ensure that the questions were understood correctly.

Respondents were interviewed on their farms as recommended by the extension officer, so that the interview process did not take farmers away from their farms. For logistical purposes it was also decided to take the respective villages one at a time and interview all the farmers at a specific village before moving on to the next village. Farmers at Kamma Furrow were interviewed first, followed by farmers at Burnshill and Lenye. No production was taking place at Ngqumeya, Wolf River or Zanyokwe villages, hence no farmers in those three villages were interviewed. Kamma Furrow, Burnshill and Lenye, however, form a major component of the total ZIS, with Burnshill and Lenye constituting of 31% and 45% of farmers, and 25% and 35% of

cultivated land in the scheme, respectively (Fanadzo *et al*., 2010). Including only farmers at Kamma Furrow, Burnshill and Lenye may therefore be considered sufficient to gather information on activities performed by farmers who are actively farming at ZIS. Ultimately, 23 farmers from the three villages were interviewed and included in the analyses. Some of the characteristics of the farmers included in this study are discussed next.

5.3.4 CHARACTERISTICS OF THE VEGETABLE PRODUCERS FROM ZANYOKWE

Table 5.1 shows the summary statistics of Zanyokwe vegetable producers. Table 5.1 shows that 80% (19) of the 23 respondents are male. The average age of interviewed vegetable producers at the ZIS is 50.8 years, which is relatively high. The phenomenon is similar to that experienced at other emerging farmer projects in South Africa. Again, it may be a symptom of the low profit margins associated with emerging farmers, which serve as a disincentive for the younger generation to participate in agriculture. The average number of years of formal education (8.5 years) and experience in vegetable production (11 years) are also low and may be an indication of lower levels of human capital exhibited by vegetable producers at Zanyokwe. Households consist on average of 5.7 members with an average of 3 persons in a household contributing to the total household income.

Table 5. 1: Summary statistics of the respondents of vegetable producers from Zanyokwe

Characteristics of respondents	Mean	Standard deviation
Age (number of years)	50.8	13.3
Education (number of years formal education)	8.5	3.1
Experience (number of years farming experience)	11.0	7.6
Gender (Male = 1, Female = 0)	0.8	NA
Household (number of people in household)	5.7	2.1
Income contributors (number of people in household contributing to household income)	3.0	1.8

The different crops cultivated by respondents since February 2010 are shown in Table 5.2. Table 5.2 shows that cabbage is the dominant crop produced by Zanyokwe farmers with 78% of the respondents indicating that they produced cabbage in 2010. Other crops that are widely produced include carrots (47.8%), beetroot (17.4%) and maize (green mealies) (17.4%). By the time of the survey no green mealies had yet been harvested. The three main crops that had already been harvested by the time of the survey were cabbage, carrots and beetroot.

Table 5. 2: Crops produced by Zanyokwe vegetable producers.

Crop	Number of respondents	Percentage of respondents
Cabbage	18	78.3
Carrots	11	47.8
Beetroot	4	17.4
Maize	4	17.4
Butternuts	3	13.0
Spinach	2	8.7
Potatoes	2	8.7
Onion	1	4.3
Tomatoes	1	4.3

For the purpose of this study, information was used on the production and marketing activities of cabbage, carrots and beetroot.

5.3.5 DISCUSSION

Early in the study it was clear that one would have to build a relationship of trust with the farmers from Zanyokwe in order to gain access to the required information. Creating such a relationship proved to be more of a challenge at ZIS than at Eksteenskuil due to linguistic problems. The relationship thus had to be developed through interpreters. The extension officer and financial manager of ZCAC were of great help in forming such relationships with the individual farmers. Ultimately, sufficient information was obtained that allowed for the proposed analyses. The next section covers a discussion of the findings from the SCP analysis of the case of ZIS that aims to gain insight into the physical environment in which the farmers operate, the way farmers behave in the environment, and the level to which they currently perform.

5.4 STRUCTURE-CONDUCT-PERFORMANCE ANALYSIS OF ZANYOKWE VEGETABLE PRODUCERS

The aim of the SCP analysis of the Zanyokwe vegetable producers is to provide a comprehensive description of what is currently happening at Zanyokwe Irrigation Scheme, as well as the marketing channels used to move the product from the farmers to the consumers. The structure component is concerned with the physical environment within which all the role-players operate; conduct is concerned with the behaviour of the role-players within the physical environment; and the performance component is concerned with the performance of the players given their behaviour within their physical environment.

5.4.1 STRUCTURE

A distinction is made between farm and market structure for the purpose of analysing the physical environment within which the farmers from Zanyokwe operate.

5.4.1.1 Farm structure

The farm structure is concerned with the characteristics of the region, the distribution of land on the scheme, the form of land tenure that exists, and the quality of the water distribution infrastructure.

Region

Zanyokwe irrigation scheme is situated about 30 km west of King William's Town, between King William's Town and Fort Beaufort in the Eastern Cape Province of South Africa (marked as point "A" in Figure 5.1).

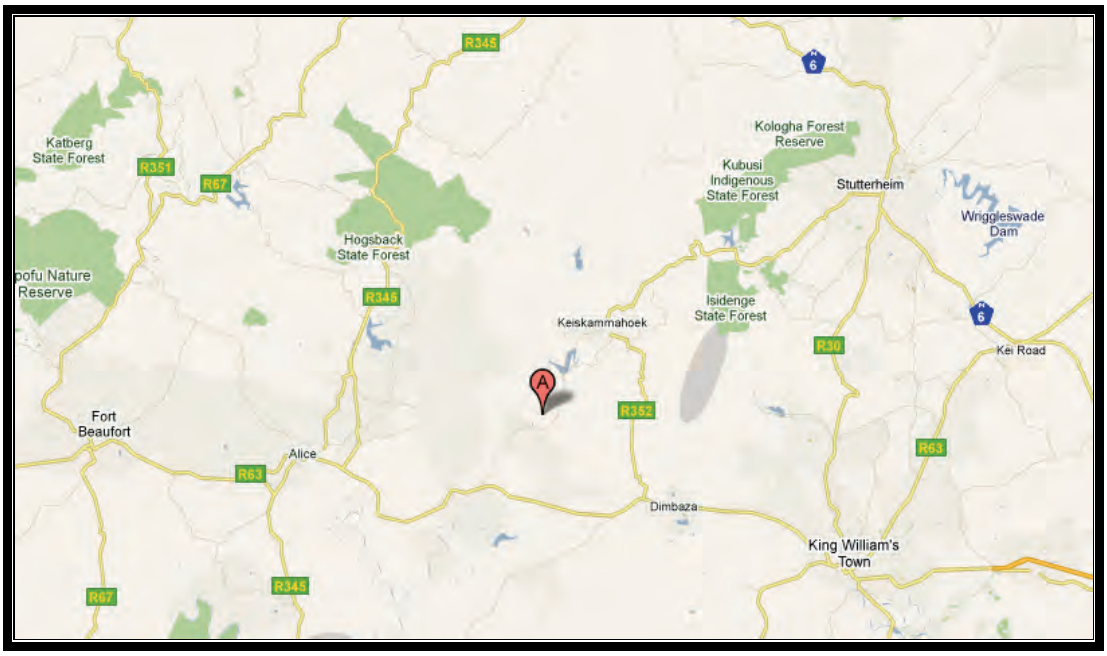

Figure 5. 1: Map to show the location of Zanyokwe Irrigation Scheme.

Source: Google Maps (2010)

The climate at Zanyokwe is semi-arid and relatively mild. Rainfall is characterised by showers, with the mean rainfall measuring about 590 mm per annum. The variability in rainfall is high. Thunderstorms occur frequently and are occasionally accompanied by hail. Summer days are frequently cloudy and overcast. Winter, on the other hand, is mostly associated with clear skies with frost occurring any time from the middle of June to the middle of August (Van Averbeke *et al*., 1998; and Rural Urban Consultants, 2001).

Distribution of land

There are roughly 402 households who are settled around Zanyokwe and who benefit directly from the scheme. Overall, the scheme consists of 635 hectares of land of which 534 hectares are irrigable. There are 66 individual small farms ranging from 1 to 10 hectares. The balance of the land is yet to be developed and irrigated. The scheme also includes 78 communal plots of which 42 are located in the Lenye region and are being occupied. The remaining 36 plots are located at Burnshill, are not occupied and have never been irrigated (Yokwe, 2005). It is important to note that not all households at Zanyokwe have access to arable land. Similar to the typical situation on smallholder irrigation schemes, plot sizes at ZIS thus are small. The small scale of operations implies that the farmers from ZIS face the same stumbling block as the farmers from Eksteenskuil and the studies found in the literature review of the stumbling blocks that exclude emerging farmers from commercial agri-food chains.

Land ownership and tenure

A diverse land tenure system is present at Zanyokwe. About 40% of land is under permission to occupy (PTO), 44% under freehold and the remaining 16% is under leasing agreements. Few farmers do have title deeds to their land. Those farmers who do not have title deeds typically lease land from people who do have PTO. The nature of a PTO, however, does not allow for land under a PTO to be leased legally. The majority of farmers at ZIS thus do not have secure land tenure, which corroborate the findings in research conducted among other groups of emerging farmers in South Africa.

According to Van Averbeke (1998) there is a quit-rent system in place which allows government to buy back land that is not cultivated. The aim of this system is to encourage land owners either to cultivate land themselves, or to rent out the land to someone else who is willing to cultivate the land. There is, however, a problem with monitoring the system hence it does not function efficiently. From discussions with role-players at ZIS, it is clear that the quit-rent system was still not functioning efficiently at the end of 2011.

A recent study conducted in the region found that the largest plot sizes are those under freehold, while plots under lease agreements are typically small (Ntsonto, 2005). Similar to other development projects, the lack of private property rights of land implies that farmers cannot use land as collateral to obtain credit. Although the tenure status of land is considered to be an important factor determining the productivity of farmers, Ntsonto (2005) found no evidence that land tenure influences the farming style adopted by farmers at Zanyokwe.

Geographic cropping structure

The crops that are mainly produced in the region of Zanyokwe include vegetables, citrus and livestock. Most farmers produce potatoes and vegetables such as cabbage, butternuts, carrots and beetroots. There are also some farmers who produce maize.

Water infrastructure

Water access and quality are not considered to be a problem at this stage (Mbengezi, 2009). The Sandile dam has adequate storage and serves the whole Zanyokwe irrigation scheme. Farmers mostly use piped irrigation systems (Van Averbeke *et al*., 1998) with sprinklers.

At one stage, there was a problem with the quality of water that caused retailers such as Pick 'n Pay to be reluctant to buy vegetables produced at Zanyokwe. Farmers washed their vegetables with raw water from the river, which was considered too contaminated to adhere to the quality standards of Pick 'n Pay. The poor quality of the water was caused by burst pipes, which since have been fixed. Although farmers still irrigate their crops with water from the dam, they wash their vegetables with purified water.

5.4.1.2 Market structure

When considering the market structure, the focus is on the different types of markets that are available to the farmers, all the different channels and actors within the channels that play a role to get the product from the farm to the end consumers, the location of the markets and infrastructure at the markets, and the availability and condition of the road infrastructure that connects the farms to the markets.

Market types

Zanyokwe farmers use a variety of market types to market their crops. Vegetables are sold to fresh produce markets, wholesalers, retailers, hawkers, and directly to consumers in the village. There are fresh produce markets located in King William's Town and East London through which the farmers sell most of their vegetables. The wholesalers to which they typically sell their crops include Proveg and Fruit and Veg, while the retailers include Spar, Pick 'n Pay, and other small retail shops in surrounding towns. Farmers are responsible for transporting their crops to the above buyers. The hawkers and community members, on the other hand, buy the produce on the farm.

Market actors

With regard to the market actors, a distinction is made between the organisers of the market and the traders in the market. The organisers provide the place to trade and regulate trade, while the market traders actively contribute to moving the physical product from the input supplier along the value chain to the end consumer.

- Organisers of the market

The fresh produce market at East London is organised by the municipality. The municipality thus provides the place to trade and regulates the trade. All the other market outlets that are

used by Zanyokwe vegetable producers are organised by the buying company itself. Farmers typically have to deliver their crop to the buyer.

- Market traders

There are a number of market actors that are involved in moving the physical product along the value chain. The different role-players who contribute to moving the vegetables from Zanyokwe producers to the final consumer are identified below.

- Input suppliers

Zanyokwe producers typically buy their inputs from the same input suppliers as commercial farmers. Those input suppliers include, amongst others, Agrotech, Omnia, Stark Ayres, Kynoch, SASOL.

- Farmers

The farmers who produce surplus vegetables are also important actors in the chain.

- Wholesalers

Again Zanyokwe producers have to sell their produce to the same wholesalers as commercial farmers. Thus they compete not only against each other, but also against major commercial producers. Some of the wholesalers to which Zanyokwe producers sell their crops include the fresh produce market at East London, Fruit and Veg and Proveg .

- Hawkers

Hawkers may be considered to be a major buyer of vegetables produced at Zanyokwe. The fact that hawkers visit farmers on their farm, buy the crop there and pay for it on the spot makes the hawker an attractive channel through which Zanyokwe producers can sell their crops. There are a large number of hawkers who procure their fresh produce from producers at Zanyokwe. Some of the farmers indicated that they sell to more than 20 hawkers on a regular basis.

- Agents

Agents refer to those actors in the chain who do the marketing on behalf of the producers by searching for buyers. The agent does not get ownership of the product; he just finds a buyer and earns commission for the service. In the past, some of the farmers in Zanyokwe did use agents to find buyers for their produce, however, some of those agents left with the crops and never returned with the money. Ever since, farmers do not trust agents and are reluctant to use the services of agents to market their produce.

- Storers

Farmers are responsible for storing their own produce. Due to the nature of the crops produced, some are not storable and need to be marketed as soon as possible. The secondary co-

operative, Zanyokwe Central Agricultural Cooperative, has converted one of its old sheds into a packshed with a coolroom where farmers can store their harvested vegetables before they are sold. The central storage of fresh produce contributes to reducing the transaction cost for the buyers since they do not have to find a large number of small producers to buy a reasonable amount of vegetables. It thus may contribute to retailers being willing to reconsider procuring fresh produce from Zanyokwe producers.

- Transporters

Hawkers collect vegetables from the farms and organise their own transport. Until recently, Proveg also collected vegetables from Zanyokwe farmers on their farms. They stopped doing that, however, due to the poor condition of the road infrastructure at the scheme. Since then, farmers are responsible for delivering their crops to the buyers. This causes a problem since few of them have their own means of transport. Typically farmers work together to rent a truck to deliver crops to East London. Note, however, that they still do not coordinate their production practices effectively hence the crops are not necessarily ready to be harvested at exactly the same time. The quality of the crop of the farmer who has to wait for the other farmer's crop is negatively affected by the delay in selling the crop.

ZCAC has recently received two trucks (one five ton and one seven ton truck) from government that are used to transport the farmers' vegetables to the buyers. Farmers pay transport fees of R5/km for the five ton truck and R7/km for the seven ton truck. The fees are payable regardless of the size of the load that is delivered. While the farmers have relatively easy access to transport facilities through the trucks of ZCAC, the farmers have never been able to send a full load when delivering their crops to the buyers. Failing to deliver full loads means that the transport cost per unit of production is high when using the ZCAC trucks.

- Retailers

The retailers to which Zanyokwe producers sell their vegetables are located in nearby towns, including, amongst other, East London, Alice, King William's Town, Middledrift, Queenstown, Fort Beaufort, and even Port Elizabeth and Mthatha. Retailers include Pick 'n Pay, Spar, Fruit and Veg, and other smaller retail shops.

- Consumers

A lot of the fresh produce that is produced at Zanyokwe is also directly sold to community members. Some of the farmers argue that the community members may even be their major clients.

Marketing channel

From the above discussion of the different actors who are involved with moving the physical product from input suppliers to the final consumer a couple of marketing channels can be

identified. When considering only the channels from the farmer downstream, the following channels can be identified:

1) Farmer – Consumer
2) Farmer – Wholesaler – Retailer – Consumer
3) Farmer – Hawker – Consumer
4) Farmer – Retailer – Consumer
5) Farmer – Agent – Retailer – Consumer

The first marketing channel shows that some farmers sell at least part of their crop to community members, who are considered to be the final consumer of the product. The second channel represents the flow of the product from the farmer, through wholesalers (i.e. fresh produce markets, Fruit and Veg, etc.) to retailers and finally to the end consumer. The marketing channel represented by Channel 3 above refers to farmers who sell some of their crop through hawkers, who sell it to the end consumer. As mentioned above, the hawkers may be viewed as one of the major buyers of fresh produce from Zanyokwe vegetable producers. The forth channel represents those farmers who sell their produce directly to retailers (i.e. Pick 'n Pay, Fruit and Veg, Spar, etc.). Finally, the fifth channel is the channel where farmers use agents to market their crops.

Flow of information

There is no free flow of information to the farmers. The farmers from ZIS have to source their information themselves. The producers' assembly and the management committee of ZCAC meet once a month to exchange information. Information transfer is mainly through oral communication.

Location of the markets

Depending on the specific input to be bought, farmers buy their inputs from input suppliers in surrounding towns, such as King William's Town, Alice, Fort Beaufort, and even in East London. The Zanyokwe Central Agricultural Cooperative also buys some of the inputs such as fertiliser, herbicide and pesticides in bulk, which farmers then can buy from the co-op in smaller quantities. The distance from their input suppliers thus ranges anywhere from a less than a kilometre to over 100 km.

Similarly, the markets for their produce also range from the farm gate to other towns, even as far as Mthatha. Although most of the produce is sold to hawkers on-farm, if farmers believe they will earn a better price for their crop by sending it to, e.g. Mthatha, they will get together to rent a truck to send their produce there. The farmers' choice of market outlet is primarily influenced by the expected price at the specific outlet under consideration. It is noted that the physical location of the ZIS implies that farmers who want to sell their crops to buyers other than hawkers and

members of the community, face relatively long distances to the buyers. King William's Town is the closest town to the ZIS and is about 20 km away. Since most of the farmers do not have their own vehicles to transport their crops to town the distance of ZIS from the market may be considered to be relatively long. The farmers from ZIS thus face the same problem as the farmers in the literature who indicated that the long distance to the market makes it difficult for them to participate in formal markets.

Infrastructure at markets

The general feeling amongst farmers is that the infrastructure at input suppliers and market outlets is acceptable. None of them had any complaints with regard to the availability of infrastructure that is sufficient and of a good quality.

Road networks

The road network (or the lack thereof) at Zanyokwe is a major cause for concern. In order to access some of the villages one has to cross the Keiskamma River. There are only low level bridges to allow the river to be crossed. One is so low that is permanently under water, i.e. it is merely a drift (Figure 5.2). If the water level is low enough the farmers do cross the river at this crossing. If the level rises too much they have to use the other crossing, which means a detour of about 10 km. Whenever it rains and the level of the river rises too high, the farmers cannot cross the river and hence cannot sell their crops.

Figure 5. 2: One of the low level bridges at Zanyokwe Irrigation Scheme that is permanently under water.

Due to the perishable nature of fresh produce, it has to be marketed within a certain period after it is ready to be harvested. The inability to get the produce to the market in time has a major negative impact on the performance of Zanyokwe vegetable producers. It also increases the transaction costs for their buyers since they are uncertain whether or not Zanyokwe producers

will be able to deliver on time. That may be one of the reasons why vegetable buyers are reluctant to enter into any form of agreement with Zanyokwe producers. The poor quality of the road infrastructure between ZIS and the buyers in the surrounding towns thus have a major negative impact on the performance of the farmers from ZIS, and hence on the livelihoods of the communities in the vicinity of ZIS. The farmers from ZIS and the people in the surrounding communities depend very much on government's compliance with its strategy to contribute to rural development (CRDP, 2009) and the recommendation of NDP (2011) by improving road infrastructure in rural areas.

Next the focus shifts to the behaviour of the actors within their physical environment.

5.4.2 CONDUCT

For the purpose of assessing the conduct of the respective actors in the value chain, a distinction is made between farm conduct and market conduct. Farm conduct is concerned with the behaviour of the farmer as a producer of the agricultural product, while market conduct is concerned with behaviour with regard to marketing the product.

5.4.2.1 Farm conduct

Farm conduct, more specifically, is concerned with cropping practices of the farmers, their farming techniques, the level of access to credit to finance production activities, and the labour that is used for production.

Cropping practices

Currently there are a number of different crops produced at Zanyokwe irrigation scheme. The crops mainly include vegetables such as cabbage, butternut, beetroot, carrots, onions and spinach, and also maize and paprika. With regard to cropping practices, farmers at Zanyokwe are very responsive to new projects. They will produce any crop that is suggested in new projects implemented in the region. For example, farmers increased the proportion of their land under maize under the influence of the Massive Foods project; some farmers made their land available for the production of paprika for a project by the Eastern Cape Development Corporation (ECDC) and Department of Science and Technology (DST); and farmers produced potatoes for a project by Potatoes SA. A possible problem for the emerging farmers at Zanyokwe is that there is some evidence that a number of them became dependent on the projects rather than on cultivating land (Mbengezi, 2009).

Despite farmers being so responsive to projects, individual farmers do have autonomous decision-making power with regard to cropping practices. Each farmer can produce whatever crop he/she wants to produce. Zanyokwe Central Agricultural Cooperative, however, aims to get

farmers to produce in a coordinated manner. The idea is that this will prevent farmers from flooding the market with a specific product and thereby force prices down. The central packhouse and coolroom have a major role to play in this regard.

Farming techniques

The farmers at Zanyokwe irrigation scheme use a combination of traditional farming techniques and new technology. Most farmers use sprinkler irrigation technology (Figure 5.3), however, there are some farmers who have installed sophisticated drip irrigation systems (Figure 5.4). The drip irrigation systems were sponsored by a project by the Small Enterprise Development Agency (SEDA) to 12 farmers on the scheme. Through the project, farmers also get access to high quality seedlings.

Figure 5. 3: Sprinkler irrigation systems typical of Zanyokwe Irrigation Scheme.

Figure 5. 4: Newly installed drip irrigation system at one of the beneficiaries of the SEDA project.

The Zanyokwe Central Agricultural Cooperative furthermore owns some tractors and implements which are rented out to farmers. All farmers may use the tractors and implements, however, they is rented on a first-come, first-served basis. Again there is no coordination between farmers with regard to renting the tractors and implements. Consequently there are situations where the tractor may spend a significant amount of time on its way to the different farms instead of working in the fields.

There are farmers who try to get the soil fertility tested for their fields. They claim, however, that they never get any feedback from the people who take the samples to be tested. The aspirations, however, are there for at least some of the farmers to apply a more accurate composition of fertiliser that will meet the requirements of the specific field under consideration.

Credit

Similar to most other emerging farmer projects documented in the literature, farmers at Zanyokwe do not have easy access to credit. The main reason for their lack of access to credit is the lack of collateral that is required by credit providers. Again the issue surrounding land tenure is highlighted. Farmers who do not have the title deeds of their land typically do not have sufficient collateral and hence do not have access to formal credit.

Recently, however, the Department of Agriculture in the Eastern Cape Province, assisted by Uvimba Development Bank developed a strategy of financing smallholder farmers, especially those at Zanyokwe irrigation scheme. The idea was to provide farmers production inputs at low interest rates. Uvimba Development Bank plays a role in uplifting the poorest of the poor in terms of supplying production inputs without requiring collateral (Ntsonto, 2005).

The revolving funds managed by Landbank provided farmers with loans of R10 000 per farmer and was intended to fund agricultural production, such as producing vegetables. An interest rate of only 10% was charged, which mean that Zanyokwe farmers received the money as soft loans. The problem, however, is that only 30% of those loans have been repaid. Reasons given for the low rate of repayment include the fact that most of the households who received the money cannot be considered to be serious and/or skilled farmers, and hence did not receive a return on investment, and then there were some farmers who did not even use the loans for agricultural production (Neven *et al.*, 2005).

Another source of credit that is available to farmers at Zanyokwe irrigation scheme is funding provided by Pick ‘n Pay given that farmers provide proper business plans. Farmers then have to pay back the loan from the sales revenues as they grow over time. Farmers need to purchase seed, fertiliser and chemicals themselves and they can also keep producing the same products as usual (Neven *et al.*, 2005). During the survey, however, none of the farmers indicated that they do have access to formal credit. Thus, despite all of the initiatives, the farmers from ZIS still

do not have access to formal credit. In the case of Zanyokwe there is thus a definite need for a financing scheme such as Mafisa that was introduced by CRDP (2009).

Labour

Both manual and mechanised labour is used by vegetable producers at Zanyokwe irrigation scheme. Due to the nature of vegetable production most of the activities require manual labour. There are some tasks that can be done mechanically, however. Few farmers own their own tractors and implements. Farmers who do not have their own equipment may rent it from the Zanyokwe Central Agricultural Cooperative on a first-come, first-served basis.

Vegetable production, moreover, is associated with a high requirement of seasonal labour. Farmers typically do not employ full-time labour but rather employ people from the community to meet seasonal labour requirements. As mentioned above, there are currently some farmers who participate in the paprika project of the Eastern Cape Development Corporation (ECDC) and Department of Science and Technology (DST). The farmers made available their land for the paprika to be cultivated. The farmers themselves have little to do with decision-making. They perform some of the required labour such as weeding and get a wage of R40 per day. Other farmers who do not participate in the project argue that the paprika project had a major negative impact on their labour market in the region. Previously family members were willing to work on the family's piece of land without compensation. Ever since the paprika project, family members tend to want to work on those farms where they can get compensated. Moreover, the wage paid by die paprika project is higher than what the wage was prior to the introduction of the project. It therefore also put some upward pressure on the wages non-participating farmers have to pay people to help them with their vegetables.

5.4.2.2 Market conduct

Market conduct is concerned with the availability and sources of market information, the way in which the price for the product is formed and behaves over time, the level of research and development to improve the product, investment in new technology, technical training and services, the behaviour of other actors in the value chain, the level of competition within the market, and the marketing strategies that are followed.

Market information

Market information is the responsibility of farmers themselves. Members of the producers' assembly and the management committee are also responsible for sourcing information which individual farmers in turn can get from them. Amongst others, market information is obtained from fresh produce markets, traders/hawkers and other buyers, and also the radio and TV. Farmers feel that the information they get is not very reliable, especially information that is obtained from their buyers. The farmers from ZIS thus are very much exposed to the lack of

market information as a major contributor to the transaction costs they face. The high transaction costs caused by the unavailability of market information suggest that the farmers from ZIS face a similar stumbling block as the farmers who are reported in the literature review who highlighted the lack of market information as a major stumbling block for them to participate in commercial agri-food chains. In the case of ZIS there is a major need for government to comply with the recommendation by NDP (2011) to ensure a free flow of strategic market information to rural farmers.

Pricing

Vegetable prices are very volatile. Buyers offer prices which they base on information that they have with regard to supply, demand and prices offered by other buyers. Farmers at Zanyokwe argue that if the buyers visit them on their land and see that other farmers too are producing the same vegetables they want to buy, the buyers instantly offer lower prices. If the farmer does not want to sell the crop at the offered price, the buyer will go to his neighbour and try to get the neighbour to sell at that price. Farmers thus typically have no idea of what price they will get for their produce before the transaction is undertaken.

Formation of price

Farmers at Zanyokwe irrigation scheme are price takers. They do try to negotiate for better prices, but due to the nature of the produce they produce they have to sell it within a reasonable amount of time after it is ready to be harvested. If farmers try to negotiate for a better price, the hawker can easily go to other farmers to get vegetables at the lower price. At the end of the day, farmers thus have to take the price they are offered or their crops may end up rotting in the fields, unsold.

The bargaining power of Zanyokwe producers may increase once the Zanyokwe Central Agricultural Cooperative gets the packhouse operational and coordinates the supply of the different types of vegetables. It will mean a reduction in transaction costs for buyers and hence they may be willing to negotiate at a higher price. Coordination of supply may also prevent oversupply of certain products at certain periods, which forces prices downwards.

Development of new products

Farmers have little influence on the development of their products. Although the try to produce vegetables from good seedlings, they are not directly involved with the development of new seedlings themselves.

Investment in new technology

Due to the lack of access to credit and limited available capital, individual farmers struggle to invest in new technology themselves. The scale on which they farm, moreover, does not necessarily justify an investment in new technology by individual farmers. In order to overcome

the problem of scale, the Zanyokwe Central Agricultural Cooperative does invest in technology. As mentioned, it also manages tractors and implements that have been sponsored to the scheme. Instead of farmers having to invest in their own technology, farmers then rent the tractors and implements from the co-operative.

Similar to the case of Eksteenskuil, the low level of investment in new technology by farmers from ZIS may suggest that the farmers from ZIS will not necessarily benefit from government investments in research and development that focus all of the attention on creating and adapting sophisticated new technology to South African circumstances as recommended by NDP (2011). The farmers from ZIS relate very much to the typical typology of emerging farmers in South Africa by exhibiting low levels of financial and human capital. Importantly, both of these types of capital are requirement at a relatively high amount to adopt sophisticated new technology.

Investment in technical training and service

Some of the other role-players along the chain provided technical training to Zanyokwe vegetable producers in the past, but only on an ad hoc basis. As an example, procurement managers of Pick 'n Pay performed a gap analysis to compare farmers' current production practices with those required for compliance with standards that would allow them to supply vegetables to Pick 'n Pay. Those findings were communicated to the farmers and recommendations were made to advise farmers what to do in order to comply. Typically, however, other role-players do not get directly involved in production, managerial or financial assistance (Neven *et al.*, 2005). During the survey in 2010, however, the respondents indicated that no training sessions were presented at ZIS during 2010. In order for government to promote training for emerging farmers as recommended by NDP (2011) it may have to explore potential incentives for training organisations that will increase their interest in providing training sessions to farmers in rural areas. Another solution may be to get private sector buyers (i.e. agro-processing firms) involved as recommended by NDP (2011) through the necessary incentives. Government can thereby create a vested interest for the private firm in the performance of the farmers, and hence a strong incentive to actively contribute towards improving the skills of the farmers from ZIS.

Competition

There are relatively high levels of competition amongst the buyers of vegetables. There are three main wholesalers to which vegetable producers at Zanyokwe sell their produce. There are a large number of hawkers that buy vegetables from the farmers. Some farmers indicated that they participate regularly in transactions with more than 20 hawkers. Similarly, there are also a number of retail shops that buy vegetables from the Zanyokwe producers. Thus, one may conclude that the level of competition between the buyers of vegetables produced at Zanyokwe

is relatively high. Moreover, the high levels of competition imply high levels of demand, which in turn may have upward pressure on the prices buyers are willing to pay for the produce.

Contract

At this stage, there are no farmers who produce vegetables under contract. The reason may be that the transaction cost for buyers is too high to contract Zanyokwe vegetable producers due to the reasons mentioned above. The lack of contracts exposes Zanyokwe producers to a lot of uncertainty with regard to the prices they are going to receive for their produce. The high level of uncertainty in turn causes an increase in the transaction costs faced by the Zanyokwe farmers. Thus, there is an urgent need to correct those factors that prevent major buyers procuring their vegetables from Zanyokwe producers. Unless those factors are not corrected, the prospects are low for establishing a preferential procurement relationship between the farmers from ZIS and a major private sector buyer as recommended by NDP (2011).

Marketing strategies

In terms of marketing strategies, most of the vegetable producers from Zanyokwe employ price strategies. Farmers typically are more than willing to accept a lower price for their produce than their neighbours if it will ensure that he will be able to sell his crop rather than let it rot in the fields. The fact that farmers are willing to undercut each other's prices consequently causes the price they receive for their crops to decrease.

In addition to the price strategy that is used by most of the producers, there are also some farmers who have realised that they can increase the price they get for their produce by cleaning it and by putting it in bunches where necessary. Thus, they also use a product strategy as a marketing strategy to market their crops.

5.4.3 PERFORMANCE

Performance is concerned with the level of success with which the farmers are producing their products given the way they behave (Conduct) within the physical environment (Structure). The performance of the vegetable producers from ZIS is a cause for concern. Figure 5.5 represents a cumulative probability distribution of the cabbage yields (per hectare) that were obtained by the farmers from Zanyokwe during 2010.

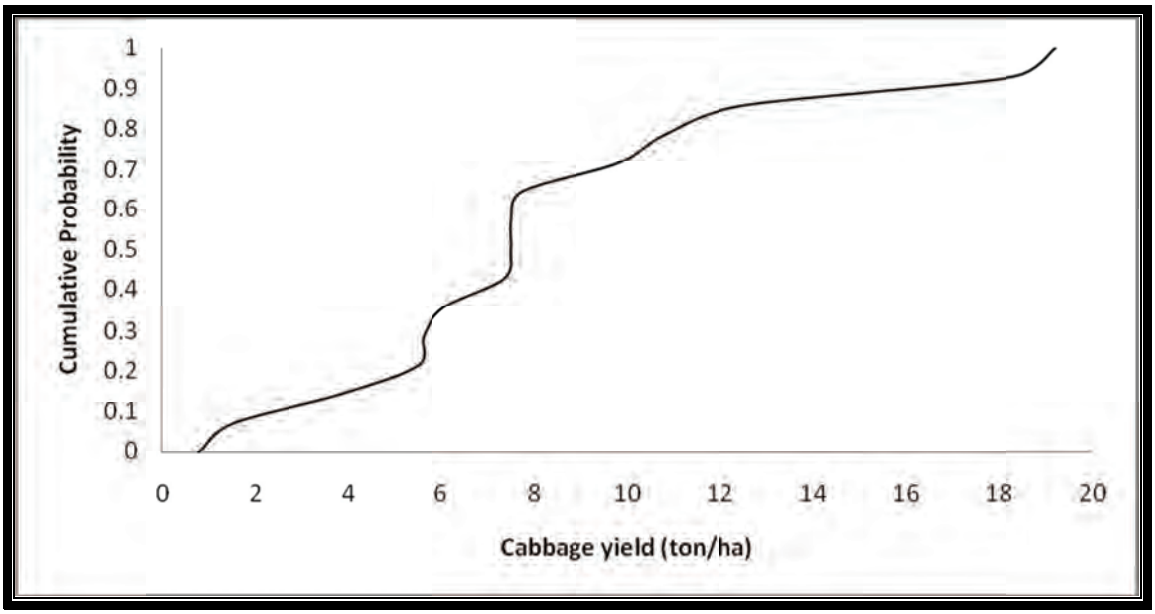

Figure 5. 5: Cumulative probability distribution of cabbage yields (tonne/ha) generated by farmers from ZIS in 2010.

The average yield of the respondents was 8.3 tons/ha with the highest yield being only 19.2 tons/ha, and the lowest yield 0.78 tonne/ha. Figure 5.5 shows that about 72% of the respondents obtained a yield of less than 10 tons/ha. It is noted that a conservative expected yield for cabbage is 30 tonne/ha (Smith, 2006). The vast majority of farmers thus generate yields of less than one third of a conservative expected yield. Clearly, there is major scope for supporting the farmers to improve their yields.

In terms of the prices the farmers received for their cabbages, they did not perform that badly. The average price received was about R4 a head, which is very near the prices received by commercial farmers. Given the small plot sizes and low yields, the income generated from cabbage production thus proves to be very low.

The farmers seem to have performed marginally better with their carrots compared to cabbages. Figure 5.6 represents a CDF of the carrot yields obtained by the farmers from Zanyokwe.

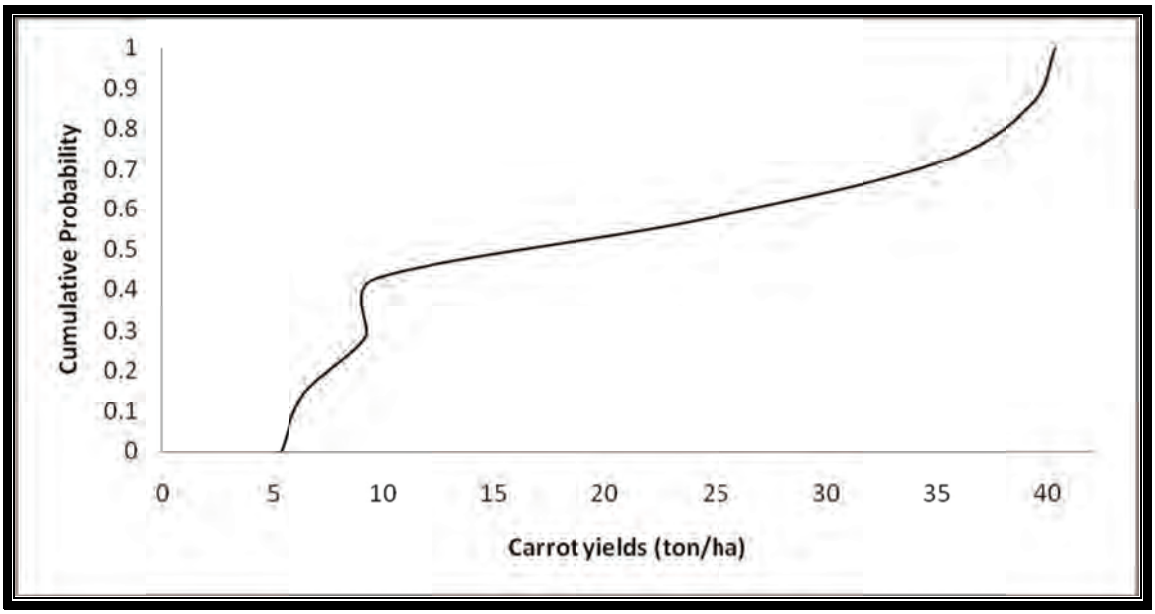

Figure 5. 6: Cumulative probability distribution of carrot yields (tons/ha) obtained by farmers from Zanyokwe Irrigation Scheme during 2010.

The average yield of 21.1 tons/ha is more in line with a conservative expected yield of 20 tons/ha (Smith, 2006). The average yield, however, is inflated by two respondents who generated good yields of 39 and 40 tons/ha. The median yield of 16.8 tons/ha thus may be a more accurate representation of the general yield obtained by the carrot producers from ZIS. Figure 5.6 also shows that about 45% of the respondents obtained yields of less than 10 tons/ha, which means that 45% of the farmers generate less than half of the conservative expected yield. Thus, although there are some farmers who perform quite well in terms of producing carrots, the vast majority of farmers perform extremely poorly.

Only three respondents grew beetroot. While one of the farmers obtained a yield of only 7.3 tons/ha, the other two farmers had yields of 18.4 tons/ha, and 25.4 tons/ha respectively. Keeping in mind that an average expected yield is in the region of 18 tons/ha and a good yield is 25 tons/ha (Smith, 2006), two farmers prove to perform well when producing beetroot. The low yield produced by the other farmer, however, again is about half of a conservative expected yield.

The prices received per bunch of carrots and beetroot correspond closely to those received by commercial farmers. The carrot producers thus prove to fail in terms of production volumes rather than getting good prices for their crops.

The poor performance of the farmers from Zanyokwe in terms of the low levels of production confirms the findings in the study by Fanadzo *et al*. (2010) and Mnkeni *et al*. (2010), who also found low yields to be produced by the farmers from ZIS. The reasons Fanadzo *et al*. (2010)

and Mnkeni *et al*. (2010) listed for the poor performance relate to poor water management, inadequate weed and fertiliser management, and low plant populations. The main conclusion from the studies by Fanadzo *et al*. (2010) and Mnkeni *et al*. (2010) was that the farmers lack the basic technical skills pertaining to the production of irrigated crops. Fanadzo *et al*. (2010) and Mnkeni *et al*. (2010) argue for "back to basics" training programmes in the areas of crop and irrigation water management. The poor performance of the farmers from ZIS, and the reasons for the poor performance as documented by Fanadzo *et al*. (2010) and Mnkeni *et al*. (2010), suggest that there is huge potential to increase the production by the farmers through the optimal allocation of resources as included in the plan of action of CRDP (2009).

5.4.4 CONCLUSIONS

The conclusion from the SCP analysis of the case of ZIS is that the physical environment within which the farmers have to operate has a major constraining impact on their performance. The farmers operate on small plot sizes without secure land tenure. Farmers consequently have no access to commercial credit to supplement their cash flow in order to ensure the timely and sufficient application of production inputs. The farmers' inability to source credit forces them to use less than 50% of the recommended input levels. The prosperous farmers also are unable to expand their production activities by buying or legally renting additional land. The road infrastructure is in a poor condition which inflates transport cost to the farmers. Interestingly, the negative impact is mainly on the ability of the farmers to produce high volumes of good quality vegetables.

On the other hand, the results also lead to the conclusion that there are sufficient marketing alternatives available to the farmers who want to sell their surplus vegetables. The competition among the buyers furthermore ensures that the farmers do get competitive prices for their good quality crops. The negative impact of the physical environment on the marketing of the vegetables is centred around the increased transport cost due to the poor condition of road networks. Once the vegetables reach the market, however, the farmers do perform relatively well. The findings from the SCP-analysis for the case of ZIS thus suggest that the farmers from ZIS face similar constraints as those documented in the literature that act as barriers to entry which exclude emerging farmers from participating in commercial agri-food chains. The challenge for the farmers from ZIS thus is to overcome/manage the stumbling blocks in such a way that the farmers still can improve their livelihoods through agricultural activities.

At this stage we have a good understanding of the behaviour of the farmers from ZIS within their physical environment. Next the focus shifts to the NIE analysis to get insight into the reasons why the farmers behave the way they do.

5.5 NEW INSTITUTIONAL ECONOMICS ANALYSIS OF VEGETABLE PRODUCTION AND MARKETING BY ZANYOKWE VEGETABLE PRODUCERS

The NIE framework of Williamson (2000) consists of four levels; social embeddedness, institutional environment, governance structures, and resource allocation. The NIE framework thus allows for a holistic assessment of the reasons underlying the behaviour of the economic actors within the value chain under consideration.

5.5.1 SOCIAL EMBEDDEDNESS (LEVEL 1)

The first level represents social embeddedness and includes cultural norms and traditions, customs, religion, and trust (Williamson, 2000). Social embeddedness is thus also concerned with social capital, which more specifically refer to trust, norms and networks (Putnam, 1993). The aim of this section is to assess the social embeddedness of the farmers from ZIS to gain insight into the cultural aspects that may influence their behaviour. First the focus will be on some of the cultural norms and traditions within the community that may affect their behaviour. Thereafter follows a comprehensive analysis of the social capital of the respondents.

5.5.1.1 Cultural norms and traditions

An aspect that is often ignored by researchers is the cultural norms and traditions within the community under consideration that may have an impact on the behaviour of the people. In the case of vegetable producers from ZIS there are some cultural norms and traditions within the community that do influence the behaviour of the farmers and have to be considered when trying to understand the behaviour of the farmers. Within this section a distinction is made between those cultural activities that get farmers off their farms, and other norms and traditions that negatively affect the coherence (and hence the performance) of the group of farmers.

- Cultural activities that get farmers off their farms

One of the major cultural activities within the community at ZIS is the attendance of initiation schools by the young men. During June and December each year the boys of about 18 years of age have to attend the initiation school for about three weeks in the bush where they are taught the activities associated with being a man. Since it is considered to be a major occurrence in the community, the families of those boys organise feasts. The feasts in the community mean that there is “lots of free food” (Mbengezi, 2011) available in the community. According to the culture everybody within the community is welcome to join the feast. The abundance of free food causes a number of farmers to feel that it is not necessary to be on their farms hence they do not cultivate their land from the time the boys leave for the initiation school.

December also sees the return of all of the people who work at the mines or in the cities during the year. Since most of the people who work in the cities are at home for the Christmas holidays, a number of cultural activities take place over the holiday period. One of the major activities during December is the slaughtering of cattle in remembrance of the ancestors. Again there is ample free food available in the community during such activities which leads to the perceptions of some farmers that it is not necessary to cultivate their land during those periods.

Although not really attributable only to the culture of the people within the community, occurrences such as funerals also prevent farmers from going to their farms. Out of respect for the deceased, the farmers will not go to his/her farm when there is a funeral in the community. They will only go after the funeral has been concluded.

While it is recognised that the cultural activities may serve as an incentive for some farmers not to cultivate their land, it is important to mention that the same cultural activities mentioned above actually create opportunities for entrepreneurship for those farmers who are willing to work on their land to ensure that they do have harvestable vegetables during those periods. Some farmers actually target December as a lucrative marketing window since "the surrounding areas' communities need food" (Kalawe, 2011). Keeping in mind that the family members who return home for December do so with money they have earned as salaries, the purchasing power within the community is substantially higher in December. Moreover, farmers who seize this opportunity do not even have to search for a buyer for their crops since the people from the community collect the vegetables at the farms. Marketing costs during those periods thus are low.

Interestingly, it is the same cultural activities that create disincentives for some farmers and incentives for other farmers to cultivate their land. The specific view of the farmers mainly depends on the personal characteristics of the farmer. Next the focus shifts to group activities that cause instability amongst the group of farmers from ZIS.

- Activities that negatively affect performance by causing instability within the group

Training is widely argued to be a major solution to improve the performance of emerging farmers to enable them to successfully participate in commercial agri-food chains. Often such training sessions are presented in the form of demonstrations on one of the farms where a specific farmer may be busy with the activity under consideration. Conceptually the idea is sound and also relates to the concept of collective learning, which is viewed as an effective way to improve the skills of emerging farmers. However, such training sessions sometimes lead to conflict within the community. Farmers whose farms are never used for such demonstrations become jealous, especially when the same farmer's land is used regularly.

The farmers then start questioning whether the farmer whose land is used is favoured in one or another way.

Some farmers also do not like the idea that other farmers visit their farms for such collective training sessions. There is a belief that some individuals have an evil spirit which may be left on the farm once the group leaves after attending the training session. Through witchcraft the individual then causes the farmer not to be as prosperous as he was earlier. The farmer thus believes he is worse off by allowing the training demonstration on his farm. Consequently conflict arises which negatively affects the collective unity of the farmers from ZIS. Keeping in mind that collective action may be viewed as a prerequisite for the sustainable participation of emerging farmers in commercial agri-food chains, activities that destabilise the coherence of the group of farmers may have serious implications for the farmers from ZIS. External organisations that aim to support emerging farmers in one or another way have to be sensitive towards the dynamics within the group to prevent destabilising its coherence.

Based on the above discussions, one may conclude that cultural activities and traditions within the community do have an influence on the behaviour of the farmers from ZIS. As part of the social embeddedness of the farmers, the social capital of the farmers is explored in more detail next.

5.5.1.2 Social capital

Social capital consists of observable but non-contractual elements such as trust, shared norms and social networks (Slangen, 2005 as cited by Milagrosa, 2007). Krishna and Shrader (2000) distinguish between structural and cognitive social capital. Structural social capital is concerned with observable participation in formal organisations, while cognitive social capital refers to subjective measures of trust and the level to which one associates with other members in the community. In order to analyse the social capital one starts with assessing the dimensions underlying the social capital of the farmers from Zanyokwe. Factor analysis is conducted on the respondents' responses to a number of statements that are used as proxies for social capital. Based on the dimensions, a social capital index is calculated for each respondent.

Factor analysis to investigate the dimension underlying the social capital of vegetable producers from Zanyokwe Irrigation Scheme

Factor analysis was used to investigate the dimensions underlying the cognitive social capital of the farmers from ZIS. By applying the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, nine of the original 20 variables were considered to measure the same underlying concept (cognitive social capital) and were included in the factor analysis. Three principle components were extracted using the eigen-value criteria, with the three components

collectively explaining 76% of the variance in the variables. The commonalities of all of the variables that were included in the three factors are greater than 0.5 which suggest that the factors explain more than 50% of the variation in each of the variables. Overall, the nine variables measure the same underlying aspect, and the three factors represent the variables relatively well.

In order to make sure that the variables load high on as few factors as possible, varimax rotation was applied. Table 5.3 shows the rotated component matrix.

Table 5. 3: Rotated component matrix1 to show the dimensions underlying cognitive social capital of vegetable producers from ZIS.

	Component		
	Informal network	General Trust	Core Trust
I get along with community	**0.925**	0.120	0.235
I get along with other farmers	**0.920**	0.093	0.238
I get along with my friends	**0.750**	0.344	0.268
I get along with my family	**0.653**	0.331	0.017
I trust other farmers	0.250	**0.774**	-0.152
All people are trustworthy	0.059	**0.749**	0.369
I trust the church and its people	0.282	**0.699**	0.239
I feel safe in my neighbourhood	0.191	0.006	**0.890**
I trust my friends	0.330	0.389	**0.792**

[1] Rotations converged in five iterations.

Table 5.3 shows that the variables that load high in the first factor (Eigen-value of 4.54) relate to the degree to which the respondents get along with other members of the community, other farmers, friends and family. Since all of the variables are concerned with the level to which the respondents get along with other people the first factor was called “Informal network”. The positive signs of the loadings moreover imply that those farmers who get along with other members of the community also tend to get along with other farmers, their friends and family.

The second factor (Eigen-value of 1.20) includes the degree to which the respondents trust other farmers, the church and its people, and the degree to which the respondents believe that all people are generally trustworthy. Given the components that comprise the second factor, the second factor was called “General trust”. Again the positive signs of the loadings of all the variables included in the second factor suggest that farmers who believe that all people can generally be trusted also trust the other farmers in the community and also the church and its people. The last factor (eigen-value of 1.12) includes the statements “I feel safe in my

neighbourhood" and "I trust my friends". Those two statements relate to the levels of trust in those people who are close to you in your daily activities, such as your support structures. Hence the last factor was called "Core trust". Again the positive signs of the two statements imply that those respondents who trust their friends also tend to feel safe in their neighbourhood.

Cronbach's Alpha values were calculated for each factor to assess the levels of internal consistency within the respective factors, or the degree to which each variable within a factor measures the same concept. The Cronbach's alpha values for the three factors are 0.88, 0.70, and 0.73 respectively. Given that Cronbach's Alpha values greater than 0.7 are an indication that the level of reliability is acceptable (Lazenbatt, Thompson-Cree, and McMurray, 2005), the Cronbach's Alpha values of the three factors suggest that the internal consistency of the variables within the factors is high. The variables that are grouped together in the respective factors thus do measure the same underlying aspect.

Based on the results of the factor analysis the cognitive social capital of the farmers from ZIS consists of three underlying dimensions. The first is the degree of informal networking, which is associated with the extent to which the respondents get along with other members in their community. The second and third relates to trust in general, and core trust respectively. The fact that the KMO test showed that the nine variables measure the same underlying concept provides evidence of the relationship between trust and networking. The results of the factor analysis thus show the role of trust in the social capital of the farmers. Next, social capital indices are calculated for each respondent to get a better understanding of the level of social capital exhibited by the farmers from ZIS.

Compiling social capital indices for vegetable producers from Zanyokwe

- Cognitive social capital

The values that represent cognitive social capital were standardised to range from zero to a maximum level of 50. A person with a cognitive social capital score of 50 trusts everybody within the community completely, and gets along very well with everybody within the community. On the other hand, a person who scores zero has no cognitive social capital at all. Such a person does not trust other people at all and does not get along at all with anybody within the community.

The average score for cognitive social capital is about 40 which suggests that the farmers from ZIS do have high cognitive social capital. Given the respective components that comprise cognitive social capital (informal networking, general trust and core trust), the farmers from ZIS seem to trust each other and get along relatively well with one another. Table 5.4 provides

summary statistics of the respondents' scores for each of the respective components to gain insight into the contributors of cognitive social capital among the farmers from ZIS.

Table 5. 4: Descriptive statistics of farmers' scores for factors representing cognitive social capital.

Standardised social capital factor	Average[1]	Minimum	Maximum	Standard deviation
Informal network	4.59	2.75	5.00	0.63
Core trust	4.02	2.00	5.00	1.03
General trust	3.41	1.00	5.00	1.21

Notes:

1: The average score is out of a possible five.

Table 5.4 shows that the average score for informal networking (4.59) is the highest, followed by the average score for core trust (4.02) and general trust (3.41). The respondents thus scored the levels to which they get along with their families, other farmers and members of the community higher than the levels to which they trust those members of the community. The respondents also gave higher scores for proxies that measure core trust compared to those variables that measure general trust levels. Simple T-tests were also performed to test whether or not the differences in the means are statistically significant. The mean of the scores for informal networking differs significantly from the mean of the scores for general trust ($p<0.01$), and from the mean scores for core trust ($p<0.05$). The difference in the mean scores for core trust and general trust also differ significantly ($p<0.10$). Thus, there is a clear difference in the levels to which the farmers tend to get along with other members in the community, their general levels of trust within the community, and the levels to which they trust their support structures that are close to them. Next, the levels to which the farmers participate in formal organisations within the community are assessed as a proxy for their levels of structural social capital.

- Structural social capital

The respondents' scores for questions that measure their active participation in formal organisations were also standardised to range from zero to 50. Again, a standardised structural social capital score of zero implies that the respondent is not a member of any formal organisation, while a score of 50 suggests that the respondent is an active member of all the formal organisations that were listed in the questionnaire. The average score for the standardised structural social capital index is 35.5 which suggests that the respondents are actively participating in some formal organisations. Recall that group activity may promote consultative decision making and collective action (Chuzu, 2005 as cited by Maluccio *et al.*, 1999). The relatively high score for structural social capital may be an indication of the potential

of collective action as a vehicle to facilitate the sustainable integration of the farmers from ZIS into commercial agri-food chains.

The descriptive statistics for the respondents' active participation in formal organisations are shown in Table 5.5 to gain insight into what group activities the respondents tend to participate in.

Table 5. 5: Descriptive statistics of farmers' participation in formal organisations.

Membership in formal organisations	Average	Minimum	Maximum	Standard deviation
Agricultural co-operative	2.57	1.00	3.00	0.73
Church	2.22	1.00	3.00	0.85
Political party	1.61	1.00	3.00	0.66

Notes:

1: Average score is out of a maximum of three.

Table 5.5 shows that the respondents indicated that they are more actively involved as members of the church and the agricultural co-operative than they are active as members of political parties. Although the average score is higher for being an active member of the co-operative (2.57) compared to the church (2.22), the difference is not statistically significant ($p<0.15$). On the other hand, the difference in the means of being active members of the church and the co-operative are statistically significant higher than being an active member of a political party even at a one percent level of significance. Interestingly, the extension officer, who is highly involved with the operations at ZCAC, suggested to the farmers that they should refrain from talking politics on the scheme since it creates tension within the group and negatively affects the level to which they co-operate and coordinate their activities for the benefit of the community. The lower score may be an indication that the respondents took that message to heart. Next the standardised scores for cognitive and structural social capital are explored to better understand the driver of overall social capital of the farmers from ZIS.

- Cognitive versus structural social capital

Figure 5.7 represents cumulative probability distributions of the standardised scores for the cognitive and structural social capital respectively to gain some insight into the comparison of the respective components of social capital.

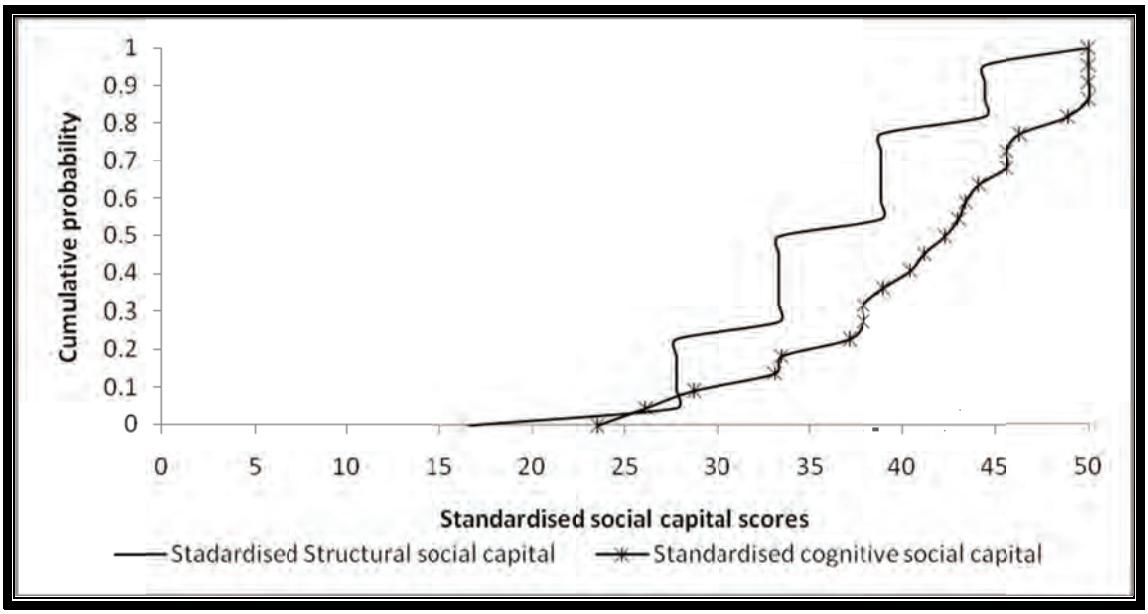

Figure 5. 7: Cumulative probability distribution graphs to compare the standardised structural and cognitive social capital of vegetable producers from ZIS.

Cognitive social capital seems to be the main driver of overall social capital of the farmers from ZIS. Figure 5.7 shows that the scores for cognitive social capital are higher than the scores for active membership in formal organisations since the distribution for the cognitive social capital lies the furthest to the right. While the minimum score for cognitive social capital is about 23, the minimum for structural social capital is about 17. There was only one person who scored 100% (50) for structural social capital, which implies that only that person considered himself to be an active member of all three organisations considered for the purpose of this analysis. On the other hand, four respondents scored 100% for cognitive social capital. These four respondents thus have complete trust in their support structures and other members of the community, and get along very well with everybody within the community. Interestingly, there is no statistically significant correlation between the structural and cognitive social capital levels of the respondents from Zanyokwe.

In the next section, an overall social capital index is calculated for each respondent based on the respective scores for cognitive and structural social capital.

- Overall social capital

The overall social capital index is the sum of the standardised structural and standardised cognitive social capital indices. The overall social capital index thus ranges from zero to 100. An overall social capital score of 100 would imply that the respondent has complete trust in the members of the community, get along with everybody, and is an active member of all of the formal organisations that were considered for the purpose of this study.

The average score for the overall social capital index is 76, which suggest that the average respondent does have relatively high levels of overall social capital. The average respondent is thus relatively active as a member of formal organisations within the community has a relatively high level of trust in the community and his/her support structures, and gets along well with other people in the community. Figure 5.8 shows the cumulative probability distribution of the overall social capital indices of the respondents.

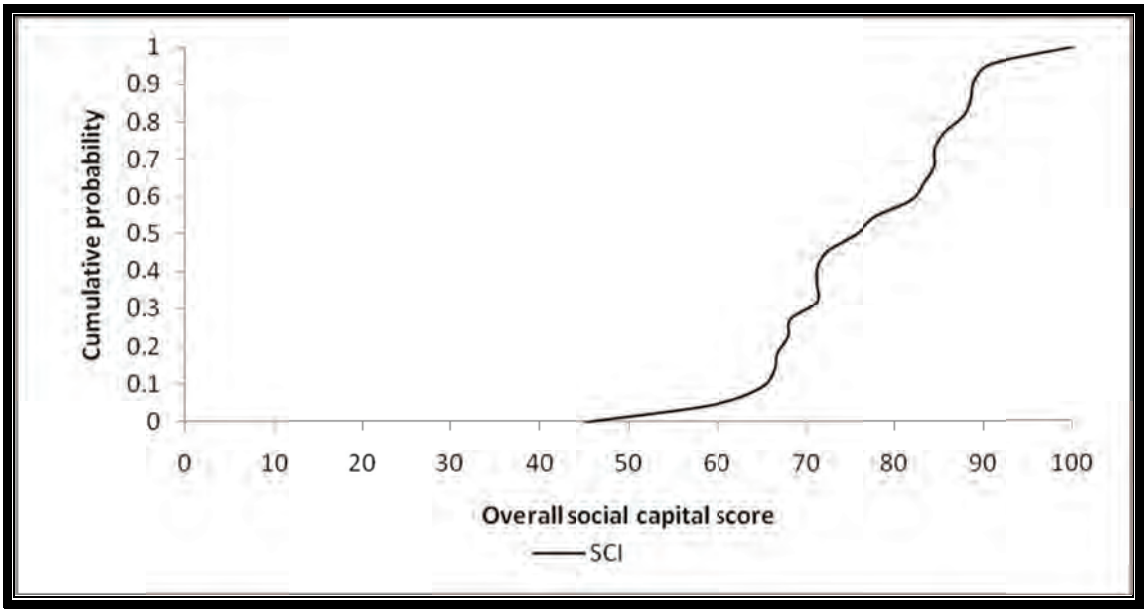

Figure 5. 8: Cumulative probability distribution of the overall social capital indices of the vegetable producers from ZIS.

Figure 5.8 shows that the minimum overall social capital score is about 45, which suggests that none of the farmers have extremely lows levels of social capital. On the other hand, only one of the respondents scored 100 for the overall social capital index. Thus, only one of the respondents has complete trust in the people in the community, gets along very well with everybody, and actively participates in formal organisations within the community.

Overall, one may conclude that the vegetable producers from ZIS do have relatively high levels of social capital. The fact that none of the farmers scored very low in terms of social capital is good since collective action may be the only way to improve the performance of the farmers who are farming on small pieces of land. Through collective action, they may overcome some of the reasons given by buyers from commercial agri-food chains why it is difficult to deal with smallholder farmers. The high levels of social capital may contribute to effective collective action among the farmers from ZIS.

Based on the findings from the analysis of the social embeddedness of the farmers from Zanyokwe Irrigation Scheme, it can be concluded that the culture, traditions and social capital of

the respondents do influence their behaviour. The cultural activities and traditions influence the incentives of the farmers to cultivate their land, while the dimensions of social capital suggest that the social capital of the farmers will affect the degree to which they are willing to work together. The case of ZIS thus provides additional evidence of the importance of considering the social embeddedness when exploring ways to link emerging farmers to commercial agri-food chains. While the relatively high levels of social capital suggest that there are good prospects for farmer-to-farmer skills transfer at ZIS, there are cultural aspects that may make it more of a challenge. Initiatives that aim to facilitate farmer-to-farmers skills transfer should be sensitive of the potential of such sessions destabilizing the coherence of the community. In the next section the focus is on the institutional environment that provides the rules and regulations that determine the way the farmers have to operate when participating in commercial agri-food chains.

5.5.2 INSTITUTIONAL ENVIRONMENT (LEVEL 2)

The institutional environment is concerned with the formal and informal rules and regulations that determine the way transactions are carried out (Williamson, 2000). The aim of this section is to assess the formal and informal institutions that affect the behaviour of the vegetable producers from Zanyokwe.

5.5.2.1 Formal institutions

The formal institutions have the purpose of ensuring that transactions are conducted in an efficient manner from society's point of view. Although it is recognised that the farmers from Zanyokwe are also influenced by the laws and regulations that affect the production and marketing of agricultural produce in general, the aim of this section is to assess more specifically the institutions that are specific to the case of vegetable production and marketing at ZIS. In the case of ZIS, the institutions of concern include those associated with land tenure and water use, the constitution of ZCAC, and the institution that was created to leverage inputs provided by government.

Land tenure

At ZIS there are three different main types of tenure system: permission to occupy (PTO), freehold, and leasing agreements. Most of the land is under PTO agreements with the tribal authority. Forty-three percent of the respondents indicated that they have a PTO for the land. While the ownership lies with the traditional authority, the farmers are allowed to use the land for agricultural purposes to generate income. A drawback of the PTO type of tenure, however, is that the farmers cannot use the land as collateral to source commercial credit to finance production activities (Ntsebetza, 1999), since government officials can appropriate land and cancel PTOs (Cousins, 2008). The lack of title deeds may be one of the reasons why the

farmers from Zanyokwe use inputs at less than 30% of the recommended levels. Farmers who do have a PTO, moreover, are not allowed to rent or sell their land to more prosperous farmers who want to expand their production activities. Such farmers also do not want to give back the PTO to the tribal authority since then they get nothing for their land.

Although there is no formal rental market for land at ZIS, some farmers do enter into lease agreements with each other. Thirty percent of the respondents indicated that they lease their land. Although ZCAC endeavours to get all of the farmers to use written contracts to govern the lease agreement (Mbengezi, 2009) most farmers enter into verbal lease agreements. The security of such verbal agreements is questionable. It has happened in the past that a farmer who was leasing a piece of land from his neighbour had a disagreement with the neighbour on another topic and the neighbour consequently took back her land. Since there was no written agreement the farmer had to accept it.

When the farmers do have written contracts and there is a dispute, the management committee of ZCAC acts as mediator and normally they do find a solution. If the management committee cannot find a solution, the parties can also go to the tribal leader. While it is very seldom necessary to go to the tribal leader, none of the respondents could recall any occasion where the farmers went to court to sort out a dispute on land that was leased.

As the last form of tenure, 26% of the respondents indicated that they have the title deeds for their land, implying freehold tenure. None of these farmers, however, were able to show the title deeds to the interviewers. Some of the farmers indicated that the title deed is in the name of their parents. Overall, the tenure of the farmers from Zanyokwe Irrigation Scheme thus proves to be insecure. The problem of insecure tenure relates very much to the case of Eksteenskuil documented in Chapter 4, and other cases of emerging farmers that were identified in the review of literature on the stumbling blocks that exclude emerging farmers from participating in commercial agri-food chains. Based on the degree of insecurity in tenure at Zanyokwe it is expected that the farmers from Zanyokwe Irrigation Scheme are also severely constrained in terms of the successful participation in commercial agri-food chains.

In addition the type of tenure they have for their land, the farmers were also asked the levels to which they feel their tenure is secure. It is interesting to note that, despite the low number of farmers having freehold, about 40% of the respondents indicated that they believe that they do have secure tenure for their land. Even some of the farmers with no written agreements said that they trust the other person such that they do feel secure. The level of trust that is embedded in the social embeddedness of the farmers thus proves to have a major impact on the behaviour of the respondents.

Water use

No water use entitlements have been awarded yet to the farmers from ZIS. ZCAC was in the process of registering a water users' association, but their application was declined since they had too few women representatives. They have not yet reapplied and the farmers are currently using the water without paying for it. The farmers thus do not have secure water use entitlement at present. However, despite the lack of secure water use entitlements, the farmers do feel that they have secure access to irrigation water.

Rules related to ZCAC

First and foremost, the ZCAC is a registered agricultural co-operative and has a constitution that specifies the conduct of its members. The co-operative also has guidelines for the use of communal machinery. Currently the farmers can use the tractors and implements on a first-come, first-served basis. While the farmers feel that such an arrangement is fair, it causes the tractors to be on the road for long periods of time (from the one farm to the next) instead of being in the fields. Farmers seem to perceive lack of mechanisation as a constraint to their performance. When asked to list the major weaknesses that constrain their performance a number of respondents identified the lack of tractors and implements to be a major weakness. The perception is also echoed by the fact that 27% of the respondents indicated that a farmer can be considered to be successful if he has his own tractors and implements. More efficient mechanisation planning and management may contribute to overcoming the constraining impact of the current level of mechanisation at ZIS.

ZCAC has also created an innovative institution that allows them to leverage the production inputs that are sponsored by government. The members of the co-operative agreed that, instead of dishing out the inputs as was intended by government, the farmers have to buy the inputs from ZCAC. The sponsored inputs normally are insufficient in volume to allow all farmers access to the inputs at recommended levels. Dishing out the inputs thus means that only some farmers get access to inputs and also at such low levels that they cannot produce high volumes of crops. Since the farmers also face cash flow constraints, they do not have the means to buy additional inputs in cash to supplement the sponsored inputs. The idea behind this initiative is that ZCAC generates funds to buy more inputs to give more farmers access to inputs, and also to give the farmers access to higher levels of inputs than would have been the case if they had to divide the sponsored inputs between all of the farmers. Through this initiative, the farmers get access to the inputs on credit for no more than two hectares of land. Before getting the inputs the farmers have to prove that they have already prepared their land. The farmers who have used such inputs have to pay at least 30% of the income from each load of vegetables that are sold till they have repaid their accounts in full. Although it is recognised that such a rule creates a strong incentive for strategic default, the management of ZCAC indicated that farmers tend to comply with the rule. The result of this institutional innovation by the farmers from Zanyokwe Irrigation Scheme is that more farmers get access to higher volumes of the necessary

production inputs to allow them to produce higher volumes of crops. Again there is evidence that prove that emerging farmers are willing to comply with rules and regulations if they perceive the benefit to outweigh the cost of the effort to comply. In both the case study at Zanyokwe and at Eksteenskuil the farmers created additional rules that have to be met. The results prove that, if incentives are correctly aligned, farmers are more willing to comply with rules and regulations. Given the fact that emerging farmers are quick to indicate that stringent requirements is an entry barrier that exclude them from the formal market may suggest that the farmers do not really perceive the benefit of participating in the formal market to be sufficient to compensate for the effort to comply with the rules. Thus, there is major scope for investigating potential incentives that may convince emerging farmers to comply with the rules and regulations to gain access to commercial agri-food chains.

The discussion of the institutional innovation at ZIS concludes the section concerned with the formal institutions that affect the behaviour of the farmers from ZIS. In the next section the focus shifts to effect of informal institutions on the behaviour of the farmers.

5.5.2.2 Informal institutions

According to the management of ZCAC and the respondents to the survey the traditional authorities do not actively influence the behaviour of the farmers through informal institutions. The informal institutions that affect the behaviour of the farmers from ZIS are mainly embedded in the level that is concerned with the social embeddedness of the farmers. None of the respondents listed any other form of informal institution that affects their farming behaviour.

The analysis of the formal and informal institutions within the institutional environment leads to the conclusion that the institutional environment does influence the behaviour of the farmers from Zanyokwe. The next section is concerned with the governance structures that are used to organise the transactions between the farmers from ZIS and their buyers.

5.5.3 GOVERNANCE STRUCTURES (LEVEL 3)

While the first two levels were concerned with the social and institutional environment within which the farmers operate, the third level is concerned with the way in which the farmers operate within their social and institutional environments. Governance structures refer to the way transactions are organised (Williamson, 1985). The optimal choice of governance structure depends very much on the characteristics of the specific transaction under consideration.

In this section, the aim is to identify the optimal type of governance structure that will minimise the transaction cost faced by the vegetable producers from ZIS. The sections starts with a comprehensive description of the characteristics of the transaction between the farmers and

their buyers, followed by the application of two decision-making frameworks to identify the optimal choice of governance structure to match the characteristics of the transaction.

5.5.3.1 Attributes of the transactions between vegetable producers from ZIS and their buyers

The attributes of the transactions that affect the choice of governance structure relates to those characteristics that affect the transaction costs associated with the transactions. More specifically, the characteristics under consideration include the levels of asset specificity, transaction uncertainty, and the frequency of transactions.

- Asset specificity

A number of different types of asset specificity cause transaction cost, physical, human, and temporal asset specificity, site specificity, and dedicated assets. Table 5.6 provides a summary of the respondents' investment in **physical assets** that are used for the purpose of the production and/or marketing of vegetables.

Table 5. 6: Farmers' investment in physical assets for vegetable production and marketing.

Transaction attribute	Number of farmers (n=23)	As percentage of total respondents
PHYSICAL ASSET SPECIFICITY		
Owns land preparation tools	5	22
Owns tools to hoe	15	65
Owns tools to apply fertiliser	5	22
Owns tools to apply chemicals	13	57
Owns vehicle to transport vegetables	3	13

From Table 5.6 it is evident that few farmers have invested in their own tools to prepare their land (22%), apply fertiliser (22%), or in a vehicle to transport the vegetables to the buyer (13%). Substantially more farmers, however, have invested in tools to hoe (65%) and to apply chemicals (57%). Given the small sizes of the plots on which the farmers produce vegetables at ZIS, and the fact that ZCAC has some tractors and implements that can be used to prepare land, individual farmers do not necessarily have to own their own land preparation tools. Similarly, the farmers apply fertiliser either mechanically by using the implements of ZCAC (mainly when preparing the land), or by hand. Again the small scale of operations does not justify investing in tools for fertiliser application. The fact that only three of the farmers own a vehicle to transport their vegetables to the buyers may be attributed to the very nature of being a start-up farmer. The farmers from ZIS are considered to be resource-poor, and were allocated such small pieces of land that the majority of farmers do not have the means to buy a vehicle.

While only a few farmers have invested in land preparation tools, fertiliser application tools, or vehicles to transport vegetables, Table 5.6 shows that substantially more farmers invested in tools to manage weeds (65%) and to apply chemicals (57%). Tools that are used to control weed and apply chemicals are much smaller and cheaper and it is worth investing in them even on small pieces of land. The farmers use a small instrument (a hoe) to manually control weed within their fields, and chemicals are applied manually by using a knapsack. Although farmers manually control weeds and apply chemicals, they can also rent the implements from ZCAC to do the activities mechanically.

From the above discussion it is evident that, except for investing in tools to hoe and knapsacks to apply chemicals, the farmers are not well invested in physical assets that are specific to the production and marketing of vegetables. When considering the fact that physical asset specificity actually refers to the investment in physical assets that are specific to the transaction under consideration, it has to be concluded that the level of physical asset specificity from the producers' perspective is low. Given that the tools can be used to produce vegetables that are sold to any other buyer, the opportunity cost of the tools is high. High opportunity cost of the tools again implies low levels of physical asset specificity.

The average levels of education and experience of the respondents are used as proxies for **human asset specificity**. The average number of years of formal education of the respondents is 8.5 years, which implies that, on average, the respondents have not completed Grade 12. Similarly, the average number of years of experience in vegetable production is also relatively low, being 11 years. Given the low levels of formal education and farming experience, it may be concluded that the production and marketing of vegetables at ZIS are associated with relatively low levels of human asset specificity.

While low levels of human asset specificity normally imply lower levels of transaction costs, it has to be recognised that the low levels of education negatively impact the ability of the farmers to search for strategic market information, and to negotiate with buyers for better prices for their produce. Thus, although one would have expected transaction costs to be lower due to lower levels of human asset specificity, the low level of formal education actually is a major cause for transaction costs faced by the farmers from ZIS. Similarly, the low levels of experience contribute substantially to the uncertainty faced by the farmers. The lack of experience contributes to farmers planting the wrong cultivars, applying insufficient levels of production inputs, and failing to identify the presence of pests on the crops to allow for the timely application of chemicals. Again, by contributing to higher levels of uncertainty, the low levels of experience positively affect the transaction costs faced by the farmers. Thus, although the education and experience of the farmers do not contribute to higher levels of transaction costs as proxies for human asset specificity, both components are major

contributors to transaction costs in terms of increasing search and information costs, and transaction uncertainty.

The nature of the production and marketing of vegetables imply that the level of **temporal asset specificity** is high in the case of ZIS. Temporal asset specificity refers to the degree to which the value of the product is constrained by time (Milagrosa, 2007). The vegetables that are predominantly produced at ZIS are perishable, which means that they have to be harvested, sold and consumed within a relatively short period of time once they mature. The quality of the produce declines steadily from the time it is harvested. The more time that goes by from the point where the vegetables are mature enough to be harvested till the point when they are sold to the end consumers, the lower is the value of the vegetables.

The low levels of investment in vehicles to transport the harvested vegetables to the buyers have a major impact on the timing of delivery, and hence the value of the vegetables. Although ZCAC has two trucks (a five ton and a seven ton truck) that can be rented by the farmers to deliver the crops to the buyers, the small scale of operations and the low levels of production mean that individual farmers rarely have sufficient volumes to justify renting such big trucks. The farmers consequently work together to rent a truck to divide the costs between them. The problem, however, is that the farmers do not formally coordinate their production practices. The vegetables from different farmers thus are not necessarily ready to be harvested at exactly the same time. The farmer who harvests his crop first thus has to wait for the other farmer(s) to harvest before they have sufficient vegetables to justify renting the truck. Waiting for the other farmers to harvest negatively affects the quality (and hence the value) of the vegetables that wait to be sold.

In order to mitigate the decline in quality of the vegetables, ZCAC has converted one of the existing sheds to a packhouse, and also installed a coolroom in the packhouse. The farmers thus can store their vegetables in the coolroom while waiting for the other farmers before delivering the vegetables to the buyers. The coolroom, however, has not yet been used optimally.

The levels of **site specificity** associated with the production and marketing of vegetables is moderately high. The farmers invest in the production of vegetables on their plots. The farmers do not reside on their farms, but rather in the community adjacent to the farms. The investment in the farms is thus exclusively for the purpose of vegetable production.

Except for the fresh produce markets and Fruit and Veg retail store that buy vegetables from Zanyokwe, other buyers do not face high levels of site specificity. The fresh produce markets have established trading facilities at specific locations, while Fruit and Veg have also invested in facilities that are used to sell the vegetables to consumers. Note, however, that the facilities

of the fresh produce markets and Fruit and Veg are also used to trade vegetables produced by farmers who are not from ZIS. Thus, although the level of site specificity is high for trade in vegetables, it is not exclusive for vegetable producers from ZIS. One thus may conclude that site specificity is not a major contributor to the transaction costs associated with the transactions between the vegetable producers from ZIS and their buyers.

On the other hand, the location of ZIS is such that the farmers do need transport to deliver their vegetables to buyers in the formal market. Since farmers typically do not have their own vehicles to transport the vegetables to the buyers, nor do they produce sufficient volumes to justify renting a truck to ensure the timely delivery of vegetables, the specific location of the farms at ZIS contributes to increasing the transaction cost faced by the farmers. The condition of the road infrastructure from ZIS to the market moreover is so poor that the buyers do not want to collect the vegetables from the farmers. The specific location of ZIS thus does contribute to increasing the transaction costs faced by the farmers.

- Transaction uncertainty

The farmers from Zanyokwe face high levels of endogenous and exogenous uncertainty. This is centred around uncertainty with regard to the possibility of receiving delayed payment, and the fact that trading partners may withhold important transaction specific information from each other. About 52% of the respondents indicated that they have received delayed payments when selling their crops and 48% of the respondents indicated that they believe that their buyers withhold important market related information from them.

Exogenous uncertainty is concerned with changes in the demand for the product, consumer preferences (Milagrosa, 2007; Verhaegen and Van Huylenbroeck, 2002:23) and the ability of the farmers to produce the demanded volumes of the products. While consumer preferences do not necessarily change to create uncertainty for the farmers, it was mentioned that the farmers from ZIS produce certain cultivars of vegetables that tend to be less in demand than other cultivars. The problem is that the farmers only receive such information when they deliver the vegetables to the buyers. The result is that they have to sell such vegetables through the fresh produce markets at low prices. The farmers thus face the uncertainty that the cultivar they have planted is not in demand by the consumers.

Another cause for exogenous uncertainty is associated with the ability of the farmers to produce high volumes of good quality vegetables. First and foremost, the farmers are very exposed to natural hazards such as hail. Given the small plot sizes, farmers who have hail damage often lose their whole crop. None of the respondents take out any form of crop insurance. Farmers who lose a big share of their crop to hail damage thus take huge financial losses.

Given that the farmers from ZIS are still very dependent on the production inputs sponsored by government, the farmers are also exposed to the timeliness of the delivery of the sponsored inputs. The timely application of production inputs is crucial to the production of high volumes of good quality vegetables. Some commercial vegetable producers even said that if they were not able to apply their fertiliser in time, they would rather keep the fertiliser to use it in time for the next crop. The impact is so severe that it does not make financial sense to apply the fertiliser too late. Similarly, cabbages (the main type of vegetable produced at ZIS) are also prone to be infested by a certain pest. The cabbages need to be treated chemically soon after the outbreak to prevent substantial damage to the crop. Again the farmers are exposed to the timeliness of the availability of the required chemicals. The dependence of the farmers from ZIS on government thus exposes them to a high level of exogenous uncertainty.

The uncertainty with regard to the ability of the farmers to produce high volumes of good quality crops also contribute to high levels of uncertainty from the buyers' perspective. All of the retail stores that were interviewed indicated that they would be willing to buy vegetables from the farmers from ZIS if they could ensure a consistent supply of good quality vegetables. The buyers said that they cannot afford to have shelves that are out of stock since it will cause their customers to go to other stores, which negatively affects their market share. Such uncertainty makes it difficult for the buyers to commit to buy from the ZIS farmers.

- Search and information cost

All of the farmers from ZIS use the spot market as a governance structure, which suggests that there are no formal relationships between the farmers and their buyers. The farmers are responsible for finding their own market information and buyers for their produce. The low levels of formal education and experience actually increase the search and information costs for the farmers.

Producers do put an effort on finding a buyer that will pay the highest price for the produce. On average, the respondents indicated that they contact more than seven buyers before they decide to sell their crops. The more buyers a farmer has to contact to find the right buyer, however, implies higher transaction costs associated with that transaction.

- Negotiation cost and ability to influence the price

Related to the high search and information costs faced by the farmers from ZIS, the low levels of human capital also contribute to increase negotiation costs for the farmers. The respondents indicated that they take about 1.5 hours on average to negotiate for a price, which suggests that they do try to negotiate for better prices for their produce. The average score for the degree to which the farmers feel that they are able to influence the price for their vegetables is 3.1 on a five-point Likert scale (one if the farmer is not able to influence the price and five if he has total control over the price). The respondents thus also believe that they do have a

relatively large influence on the price they receive for their crops. The time they spend negotiating is thus to a certain extend offset by their ability to actually influence the prices they receive.

From the above discussion it is evident that, although the levels of asset specificity are low, the farmers from ZIS do face considerable levels of transaction costs. Especially in terms of uncertainty and search and information costs, the farmers do face high transaction costs. The high transaction costs suggest that the farmers from ZIS may also be excluded from participating in commercial agri-food chains as is the case with the emerging farmers discussed in the literature review. High transaction costs associated with a transaction suggests that there may be a need for a higher intensity of coordination control to mitigate the transaction costs. Next, the framework of Mahoney (1992) is applied to identify a vertical coordination strategy that will match the characteristics of the transaction.

5.5.3.2 Matching the transaction with the optimal type of governance structure for vegetable producers from ZIS

The framework of Mahoney (1992) considers three conditions when deciding on a vertical coordination strategy. The first is concerned with the level of separability, which refers to the degree to which it is possible to distinguish between the values of the contributions of the different transacting partners in order to compensate each party accordingly. The lower the level of separability, the greater the need for more intense coordination control through higher levels of vertical coordination. The second condition is concerned with the levels of asset specificity. The higher the level of asset specificity, the higher is the need for more intense coordination control. The degree of task programmability is the last condition that is considered within the Mahoney framework. Task programmability is concerned with the level of uncertainty associated with a transaction. The higher the level of uncertainty, the lower the level of programmability and the higher the need for more intense coordination control.

The transactions between the vegetable producers form ZIS and their buyers are characterised by high levels of separability. When considering the characteristics of the transactions it is clear that the value of the contributions of the farmers and their buyers can easily be distinguished. The farmers produce the vegetables, sell them to the buyers and get paid market related prices for their produce. The buyers add value to the vegetables, mainly in the form of place utility by making them available at more convenient locations to their buyers, and get paid market related prices when selling the vegetables. Each party thus gets rewarded based on the value they contribute to the vegetables. The high level of separability suggests that a relatively low intensity of coordination control is required to manage the transaction.

When considering the second condition, one has to conclude that the transactions are characterised by a high degree of uncertainty, hence a low degree of programmability. As discussed above, the transaction exhibits both endogenous and exogenous uncertainty. High levels of endogenous uncertainty expose the farmers to opportunistic behaviour from their buyers. The farmers have limited ability to influence the prices, and they also face delayed payments. Similarly, high levels of exogenous uncertainty imply that farmers do not know whether they would be able to produce a high volume of good quality vegetables, nor whether they would be able to sell the crops at high prices when they have successfully produced them. The buyers of vegetables too face a high degree of uncertainty since they are not sure that the farmers will produce a sufficient volume of good quality vegetables to justify the effort of dealing with the ZIS farmers. The levels of programmability thus are low both from the perspective of the farmers and their buyers. The low levels of task programmability suggest the need for a higher degree of coordination control to reduce the uncertainty associated with the transactions.

The levels of asset specificity can be considered to be low. Although the levels of specificity for some types of asset specificity may be considered to be high in terms of vegetable production and marketing, those assets are not specific only to the transaction between the farmers from ZIS and their specific buyers. Since the vegetables can be sold to any buyer, the opportunity costs of those assets still are high.

Given that the transaction is characterised with low levels of programmability and asset specificity, but a high degree of separability, the spot market is the vertical coordination strategy that is recommended by the Mahoney framework. Recall that the spot market is the type of governance structure that is currently used by all of the farmers from ZIS. The findings from the application of the framework of Mahoney (1992) thus suggest that the farmers are using the optimal type of governance structure to manage transactions with their buyers. In the next section the decision making framework of Peterson *et al*. (2001) is also used to investigate the question as to whether or not there may be a need for more vertical coordination to control the transactions between the farmers from ZIS and their buyers.

5.5.3.3 Is there a need for more vertical coordination by Zanyokwe vegetable producers?

The question whether or not to change from the current vertical coordination strategy to another is concerned with the mismatch in coordination errors and the intensity of coordination control associated with the current coordination strategy. In this section, the transactions between the farmers from ZIS and their buyers are assessed using the framework of Peterson *et al*. (2001) to determine whether or not there is a need to change the current governance structure. The decision-making framework developed by Peterson *et al*. (2001) suggests that a firm will only

change from the current to a new coordination strategy if the answer to five interrelated questions is “yes”.

Question 1 – Is the current marketing system too costly?

Coordination errors may be considered to be costly if the coordination errors regularly expose the firm to opportunistic behaviour by their transacting partners, result in chronic over or under production versus demand, or if the existing coordination strategy is more costly to execute than the coordination errors it is designed to control (Peterson *et al*., 2001).

Zanyokwe vegetable producers face relatively high levels of uncertainty. The farmers from ZIS feel that their buyers are withholding important strategic market information from them, and they also receive delayed payments from their buyers. The perception is thus that the buyers operate opportunistically at the expense of the farmers from ZIS. In addition to the high levels of uncertainty, the farmers also face high levels of temporal specificity and site specificity. The quality of the vegetables is negatively influenced by time. The perishable nature of vegetables implies that they have to be sold and consumed within a certain period of time once they have reached the required stage of maturity. The farmers are also located at a specific location. The investments on their farms are exclusively for the purpose of vegetable production. The high levels of temporal and site specificity contribute to the costliness of coordination errors.

On the other hand, vegetable production and marketing by farmers at Zanyokwe are characterised by low levels of physical asset specificity. Although some farmers have invested in their own implements for hoeing and applying chemicals, few farmers have their own vehicles for transporting their vegetables, and implements for land preparation. Moreover, the assets can also be used for the production of vegetables that are sold to other buyers and hence are not specific to the transaction under consideration. The opportunity costs of those assets are thus high. Similarly, the low average age and experience of vegetable producers suggest that the level of human asset specificity in the case of vegetable production and marketing at Zanyokwe is also low.

While the low levels of physical asset specificity and human asset specificity associated with the production and marketing of vegetables by Zanyokwe farmers may be an indication that the current system governed by the spot market is not too costly, the high levels of temporal asset specificity and uncertainty associated with vegetable production suggest that coordination errors are too costly. Given that the current coordination system may potentially be considered to be too costly, one should move to the second question in the decision making framework.

Question 2 – Would an alternative strategy reduce the costliness of the current marketing system?

In the second question, the issue under consideration is whether or not the alternative strategy will be a better match between the intensity of coordination control and the costliness of coordination errors.

Despite the relatively low levels of asset specificity, the high levels of uncertainty, temporal and site specificity suggest that the cost of coordination errors may be greater than the cost of the spot market as coordination mechanism. A higher level of vertical coordination, such as specifications contracting, or even relationship-based or equity-based alliances, is likely to reduce the costliness of coordination errors. Higher levels of vertical coordination may contribute to more efficient flow of information from the buyers to the producers, which in turn will considerably reduce the level of uncertainty. More efficient flow of information will also reduce the potential for opportunistic behaviour by either party in the transaction. More vertical coordination may contribute to Zanyokwe farmers overcoming the problem of temporal specificity. Higher levels of coordination will ensure that farmers know what crops to produce and when to produce them; what specifications the products should meet to earn the highest possible income; and it will ensure that buyers are available for their produce by the time it is ready to be harvested.

Based on the above one thus may conclude that a higher degree of vertical coordination will reduce the costliness of coordination errors faced by the farmers from ZIS. Since a higher level of vertical coordination will reduce the costliness of coordination errors (the answer to Question 2 is “yes”), one may continue to the third question.

Question 3 – Is an alternative strategy programmable?

The programmability of the alternative vertical coordination strategy is concerned with the question whether or not effective, specific management routines exist for making the potential strategy workable (Wysocki *et al*., 2003).

The low levels of human capital of the individual farmers from ZIS may suggest that the individual farmers do not exhibit the required management routines to allow them to consider vertical coordination strategies that are associated with higher degrees of intensity of control. The bulk of the experience of the farmers is to sell vegetables through spot market transactions to the fresh produce markets, hawkers, and some retail stores. Recall that the average farmer from ZIS has not completed Grade 12 at school. The farmers do not have the necessary skills to manage transactions under higher degrees of intensity of control.

Through ZCAC, however, one may argue that the farmers collectively may exhibit the specific management routines that are required to make specifications contracting workable. The

management of ZCAC and the extension officer that has been seconded to ZCAC actively contribute to getting the farmers to coordinate their production activities and to negotiate with buyers for better terms of trade when dealing with the farmers from ZIS. If the farmers were willing to better coordinate their production and marketing activities through ZCAC and allow the management of ZCAC to manage the relationship on their behalf, one might conclude that the alternative strategy may be programmable. Given the "yes" answer to Question 3, one has to proceed to assess whether or not the alternative strategy is implementable.

Question 4 – Is an alternative strategy implementable?

Assuming that Zanyokwe vegetable producers coordinate their production and marketing activities by collectively selling high volumes of good quality vegetables via ZCAC, there are definitely some buyers with which Zanyokwe farmers can collaborate with in a more vertically coordinated relationship. The compatibility of such partners will depend upon the strategic direction of the businesses of both parties.

Higher levels of vertically coordinated relationships with buyers do not require substantial capital outlay from the side of Zanyokwe vegetable producers. There is already a packhouse with a coolroom on the premises of ZCAC. Both the packhouse and the coolroom are large enough to accommodate sufficient volumes of vegetables to meet the requirements from the buyers. The management of ZCAC also contributes to the required competence of control that would be required by a higher level of vertical coordination. A higher level of vertical coordination is also institutionally acceptable, which is the last requirement for a coordination strategy to be deemed implementable.

Based on the above discussion, one thus may conclude that changing from the current spot market system to specification contracting, relationship-based or equity-based alliances will reduce the costliness of coordination errors; it is programmable; and it is implementable. However, before one may finally conclude that more vertical coordination will be more efficient, one has to consider whether or not the risk/return trade-off for changing from contracting is acceptable.

Question 5 – Is the risk/return trade-off acceptable?

Higher levels of vertical coordination will reduce a lot of the risks and uncertainty faced by Zanyokwe vegetable producers; they may contribute to more efficient flow of information from the buyers to the producers to ensure that producers produce the right crop at the right time that meet the requirements of consumers; and they may also ensure that farmers have buyers for their produce in a timely manner to ensure that they can sell their produce at an optimal level of maturity. The increase in income from being able to sell high quality vegetables may be substantial. The increase in risk that Zanyokwe farmers will face is more strict enforcement of quality specifications, especially with regard to the use of agro-chemicals on their vegetables.

The increase in return that they may get from the more vertically coordinated relationship will be sufficient to compensate for the increase in risk.

From the buyers' side the increase in risk from dealing with emerging farmers is more substantial. They face substantial transaction costs when dealing with emerging farmers due to the very nature of emerging farming in South Africa. They will face the risk that there will be insufficient volumes of good quality vegetables to keep their shelves stocked; and that farmers may have used chemicals that are prohibited. Such occurrences may have a detrimental impact on the brand of the buyers. Note, however, that the potential of such occurrences to occur creates the incentive for the buyers to actively assist Zanyokwe farmers to ensure that all the requirements are met. Unfortunately, the return for buyers at this stage is insufficient to compensate for the increase in risk they will face. The only advantage for buyers to deal with Zanyokwe farmers is in the form of Black Economic Empowerment (BEE) and/or Social Corporate Investment.

Based on the analysis of the question whether or not there is a need for more vertical coordination for Zanyokwe vegetable producers, one can conclude that the farmers will definitely benefit from higher levels of vertical coordination. Specifications contracting or even some form of alliance with buyers do meet all the requirements specified in the decision making framework. However, from the buyers' side the picture is different. Ultimately, the return for buyers is insufficient to compensate for the increase in risk from dealing with Zanyokwe producers. Since only the Zanyokwe farmers will benefit monetarily from such a relationship, the true compatibility between Zanyokwe farmers and their buyers to form more vertically coordinated relationships is questionable. Given the current situation and the fact that one would prefer both parties to be better off as a result of the new relationship, one has to conclude that higher levels of vertical coordination between Zanyokwe vegetable producers and their buyers is not viable at this stage. The optimal coordination strategy for the farmers from ZIS and their buyers is thus the spot market.

5.5.3.4 Conclusions

The analysis of the governance structures leads to the conclusion that the transactions between the farmers from ZIS and their buyers are characterised by high levels of uncertainty, and site and temporal asset specificity. On the other hand, the transactions exhibit only low levels of physical asset specificity. By implication the assets thus can also be used to produce vegetables that are sold to other buyers and consequently exhibit high opportunity cost. When applying the framework of Mahoney (1992), the transactions are characterised to exhibit low levels of programmability and asset specificity, and high levels of separability. Low levels of programmability imply high levels of uncertainty associated with the transaction. High levels of separability mean that a clear distinction can be made with regard to the value of the

contribution of each transacting party. Being able to distinguish the contribution of each party allows each party to be rewarded according to their contributions to the value of the product. Based on the characteristics of the transactions, the framework of Mahoney (1992) recommends that the spot market is the best match of the intensity of coordination control, and hence is the optimal choice of governance structure for the farmers from ZIS.

The application of the decision-making framework of Peterson *et al*. (2001) highlights that the individual farmers from ZIS may not exhibit the required management skills to manage transactions with higher degrees of intensity of coordination control. On an individual basis it is evident that the spot market is the optimal choice of governance structure. When the farmers from ZIS can coordinate the production and marketing activities and allow the management of ZCAC to manage the transaction on their behalf, it may be concluded that a higher degree of intensity of coordination control may be implementable. However, for a vertically coordinated relationship to be sustainable, all parties in the transaction have to benefit from the relationship. Currently one has to conclude that the benefit for the buyers is not likely to be sufficient to compensate for the increase in the risk they face when dealing with the small-scale farmers from ZIS. The incentive for the buyers is thus too small for them to commit to such a vertically coordinated relationship. Although the farmers from ZIS will benefit substantially from a vertically coordinated relationship with their buyers, the conclusion based on the characteristics of the transaction (from both parties point of view) is that the spot market is the optimal choice of governance structure for the case of vegetable production and marketing from ZIS.

The results from the analysis of the case of ZIS show that it is not as simple as establishing strategic partnerships between emerging farmers and potential buyers in commercial agri-food chains as recommended by CRDP (2010). If the costs for the potential partner is higher than the benefit it will receive from the partnership the relationship most likely will not succeed. Unfortunately the very nature of being start-up farmers means that the buyers will face substantial transaction costs when dealing with emerging farmers. Government will have to investigate potential incentives that will increase the benefit for private sector firms to compensate for the increase in transaction costs they will incur when entering into the relationship with emerging farmers.

5.5.4 RESOURCE ALLOCATION (LEVEL 4)

The last section in the NIE framework is concerned with the allocation of resources given the way the economic agents behave within the institutional and cultural environments. The aim of this section is to investigate the levels of efficiency with which the farmers from ZIS use their production inputs, and with which the farmers convert their crops into revenue. More specifically, the levels of technical, allocative, and economic efficiency are investigated on the production side to determine the level to which output can be increased at current input levels,

and to which production costs can be reduced by changing the combination of production inputs that are used in the production process. Marketing efficiency is investigated to explore whether or not the farmers could have generated higher revenue from the crops they have produced. Lastly, the information on the technical and marketing efficiency levels is used to determine the levels of overall efficiency of the farmers which give an indication of the level of efficiency with which the farmers converted their production inputs into revenue.

5.5.4.1 Technical efficiency analysis of the vegetable producers from ZIS

Technical efficiency refers to the ability of the respondents to produce the highest amount of outputs with a given amount of production inputs, or to produce the given amount of output with lower levels of inputs. In essence, technical efficiency is concerned with the conversion of production inputs into output. Since the farmers from ZIS are using input levels that are substantially lower than the recommended input levels, technical efficiency is investigated from the output side to determine the amount of output that should have been produced at current input levels. The reason for focusing on the output levels is to prevent the interpretation of the results from confusing the farmers under consideration. When focusing on the input side the results are interpreted as the level to which inputs could have been reduced to produce the same amount of output. Although it is recognised that the farmers will benefit if they focus on minimising the inputs to produce the current output levels, one would rather want to advise them to increase their yields in order to expand their revenues. By changing the focus one could stimulate the farmers to think bigger.

A cumulative probability distribution of the technical efficiency scores of the respondents is shown in Figure 5.9 in order to get an understanding of the distribution of the technical efficiency scores of the farmers from ZIS.

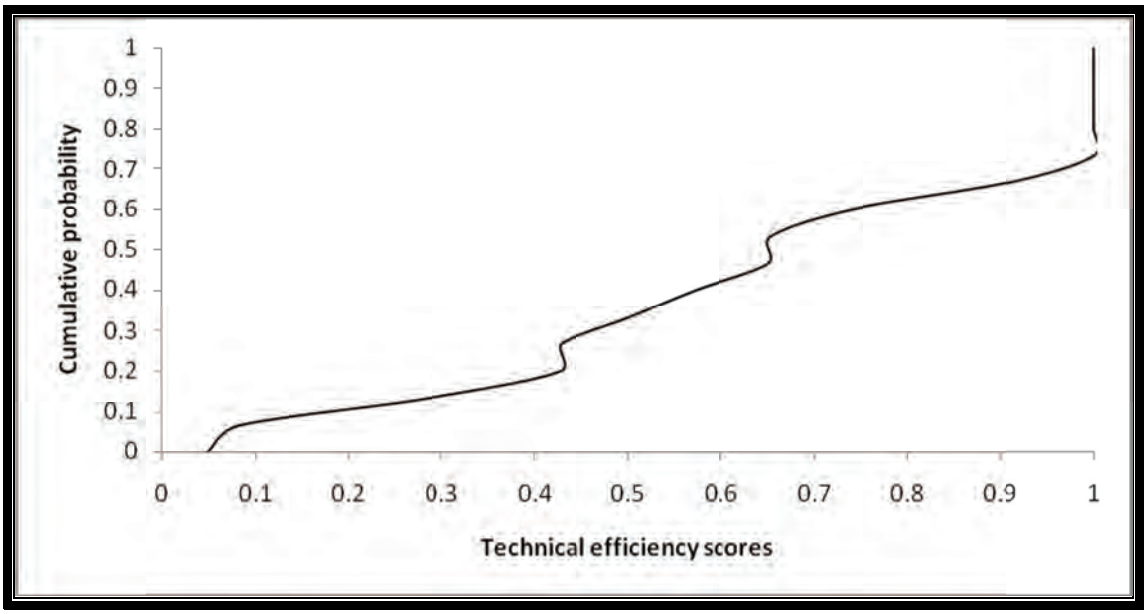

Figure 5. 9: Cumulative probability distribution of the technical efficiency scores of vegetable producers from ZIS.

Figure 9 shows that the technical efficiency scores of the farmers from ZIS range from 0.05 to one. Those farmers who scored a TE score of one are producing on the efficiency frontier and, compared to the other farmers included in the analysis, could not have produced a higher amount of output at their current input levels. On the other hand, a farmer with a technical efficiency score of 0.05 could have increased his output by 95% (1 – 0.05) at the current input levels.

About 30% of the respondents are considered to be technically efficient since they have technical efficiency scores of one. The bottom third group of farmers obtained technical efficiency scores lower than 0.5, which suggests that a third of the farmers could have increased their output by more than 50% at the current input levels to produce at the efficiency frontier. The technical efficiency scores of the other farmers range between 0.5 and one. Overall, there is huge scope to improve the technical efficiency levels of the farmers from ZIS. The approach that was used to calculate the technical efficiency scores maximises the output per unit of input applied. The farmers can thus improve their yields without having to use more inputs. Thus, although resource-poor farmers do not necessarily have the means to increase their input usage, the farmers from Zanyokwe can still improve their performance by making sure that they use the inputs that they do apply efficiently enough to produce the maximum amount of output from those inputs. Support with regard to the technically efficient use of production inputs may help the farmers to increase their production levels. The results of the technical efficiency analysis of the farmers from ZIS again show that the focus of CRDP (2009) on increasing production levels through the optimal allocation of resources, definitely has major scope to

increase the performance of emerging farmers and hence to improve the livelihoods in rural communities.

Since profitability is also a function of production costs, the next section focuses on the levels to which the farmers use combinations of production inputs that will minimise their production costs.

5.5.4.2 Allocative efficiency analysis of the vegetable producers from ZIS

In this section, allocative efficiency is assessed in terms of cost efficiency. Cost efficiency is the ratio of the minimum possible cost to produce the output to the actual cost incurred by the respondent to produce the output. A cost efficiency score of one implies that the ratio of the minimum cost to actual cost is one, which means that the farmer has produced the output at the minimum cost. The lower the cost efficiency ratio, the higher is the actual cost compared to the minimum cost. A person with a cost efficiency score of 0.5 thus could have produced the same amount of output at 50% (1 – 0.5) of his actual cost. Figure 10 represents the cumulative probability distribution function of the cost efficiency scores of the respondents from ZIS.

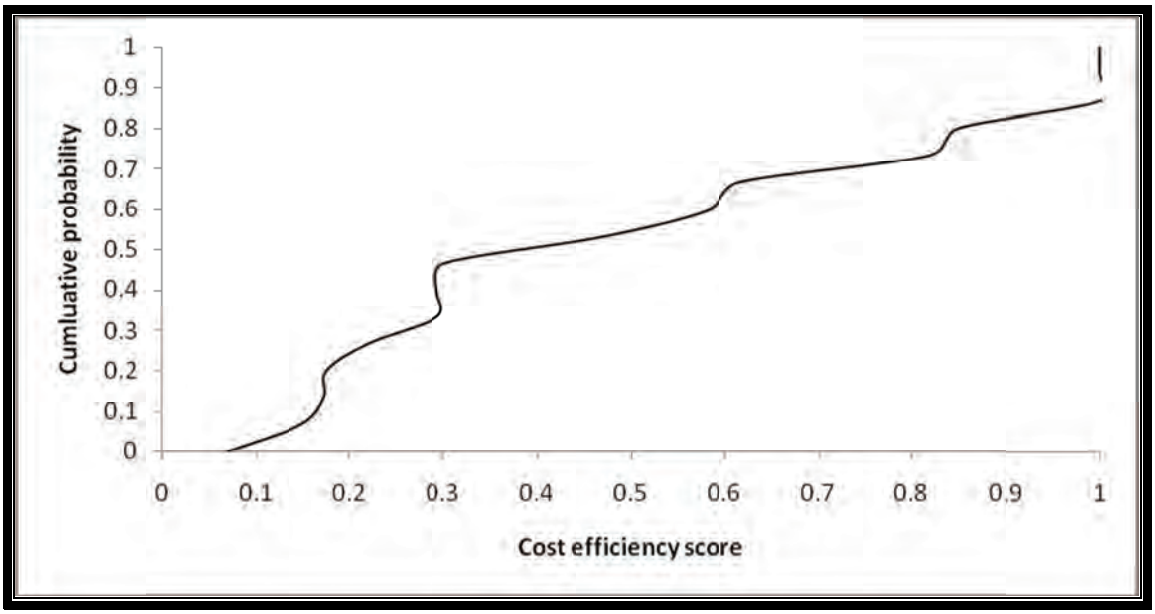

Figure 5. 10: Cumulative probability distribution of cost efficiency scores for vegetable producers from ZIS.

Again, there are some respondents who have scored a cost efficiency score of one. Figure 5.10 shows that about 15% of the respondents can be considered to be cost efficient. Those farmers have produced their crops at the minimum cost. Thus, about 85% of the respondents could have produced their produce at lower cost by changing their input combinations. As a matter of fact, 50% of the respondents obtained cost efficiency scores of less than about 0.35. The

bottom third group of farmers have an average cost efficiency score of 0.16. Half of the respondents could thus have produced their output at 35% or less of their actual cost. A third of the farmers could have produced their output at only 16% of their actual cost. The low levels of cost efficiency are a major cause for concern given that emerging farmers by definition are resource poor. Evidently, there is scope for supporting and training the farmers from ZIS to identify the cost minimising combination of inputs that will allow the farmers to produce their vegetables at the minimum possible cost.

Next, the focus shifts to the analysis of the levels of economic efficiency of the farmers from ZIS.

5.5.4.3 Economic efficiency analysis of the vegetable producers from ZIS

Economic efficiency is the product of the technical and allocative efficiency of the respondents. Figure 5.11 shows the cumulative probability distribution of the economic efficiency scores achieved by the vegetable producers from Zanyokwe.

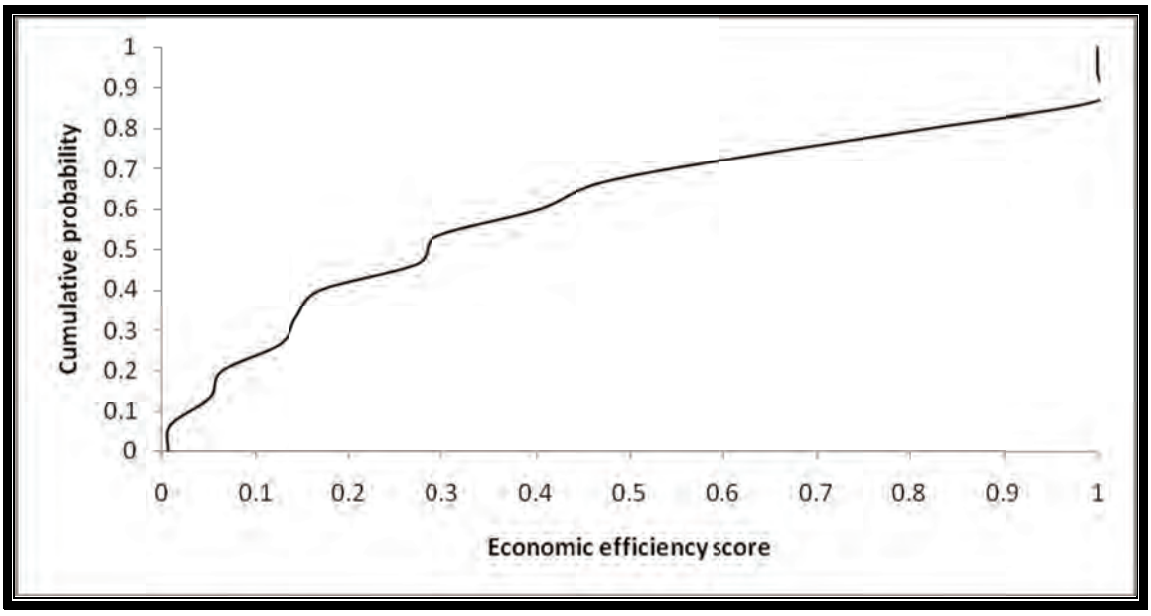

Figure 5. 11: Cumulative probability distribution of economic efficiency scores for vegetable producers from ZIS.

Figure 5.11 shows that the levels of economic efficiency range from 0.005 to one. An economic efficiency score of one implies that the particular respondent is both technically and allocatively efficient. On the other hand, an economic efficiency score of 0.005 implies that the respondents scored very low in either technical efficiency, or allocative efficiency, or maybe even both types of efficiency. About 70% of the respondents achieved economic efficiency scores lower than 0.5. The low economic efficiency scores suggest that there is huge potential to improve the performance of the vegetable producers from Zanyokwe by supporting the farmers to use their

inputs in a technically efficient manner, and identifying those combinations of inputs that will minimise production cost.

The low levels of economic efficiency ultimately mean there is scope for improvement in the production sub-DMU unit of the farm business. Next, the focus shifts to the marketing sub-DMU to assess the degree to which the farmers are able to maximise their revenue from the vegetables they produce.

5.5.4.4 Marketing efficiency analysis of the vegetable producers from ZIS

The aim of the marketing sub-DMU is to convert the crop that was produced on the farm into the maximum amount of revenue. Those farmers who generate the highest income per unit of vegetables are considered to be marketing efficient. Figure 5.12 shows the cumulative probability distribution of the marketing efficiency scores of the vegetable producers from Zanyokwe.

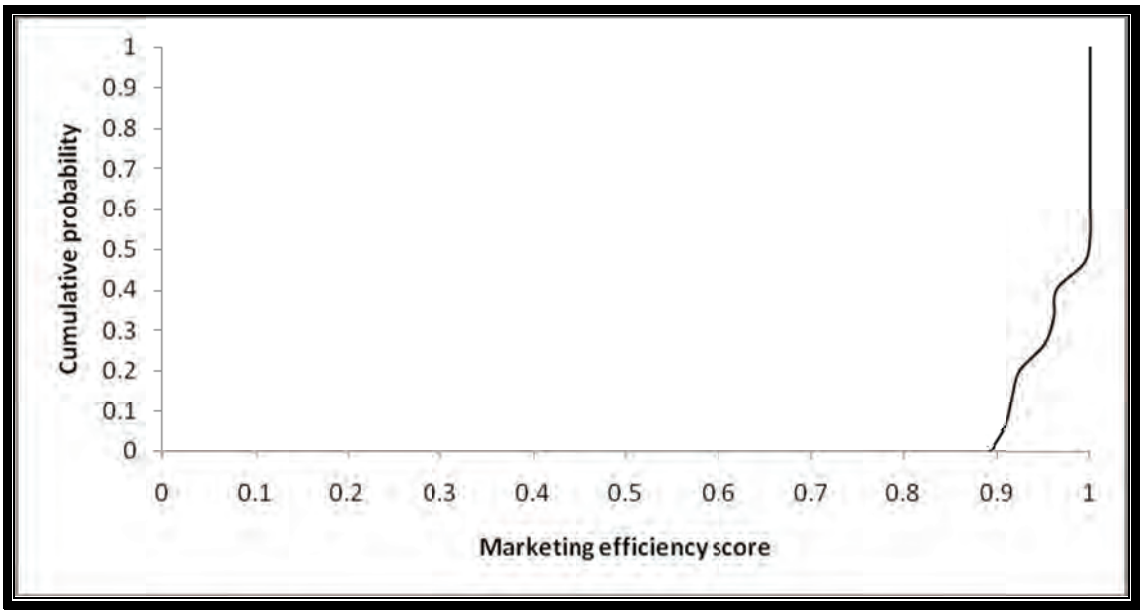

Figure 5. 12: Cumulative probability distribution of marketing efficiency scores for vegetable producers from ZIS.

The distribution of the marketing efficiency scores shown in Figure 5.12 suggests that there is little variation in the marketing efficiency scores achieved by the farmers from Zanyokwe. While the maximum score is one, the minimum score is about 0.89. The worst performing farmer thus received an income of 89% of what he could have received if he was considered to be marketing efficient. Almost 50% of the respondents achieved a marketing efficiency score of one, which means that about half of the farmers could not have increased their revenue per unit of vegetables produced. The reasons for the little variation in the marketing

efficiency score may be an indication of the fact that the farmers actually have very little influence on the price they receive for their crops. One would have expected that, if the farmers really were able to negotiate for better prices, at least some of the farmers should have been able to generate substantially higher revenues per unit of production than others. The results show, however, that buyers are paying the different farmers very similar prices for their vegetables.

When considering the marketing efficiency scores of the farmers from Zanyokwe, there currently seem to be relatively little scope for the farmers to improve their revenue per unit of production and hence their profitability by learning from each other. In the next section, the overall efficiency score is calculated to ultimately see the ability of the farmers to convert their production inputs into revenue.

5.5.4.5 Overall efficiency analysis of the vegetable producers from ZIS

Overall efficiency is concerned both with the technical efficiency and the marketing efficiency of the respondents under consideration. The level of overall efficiency of a farm business thus can be viewed as a measure of overall performance. Figure 5.13 represents the cumulative probability distribution graph of the overall efficiency scores of the vegetable producers from Zanyokwe.

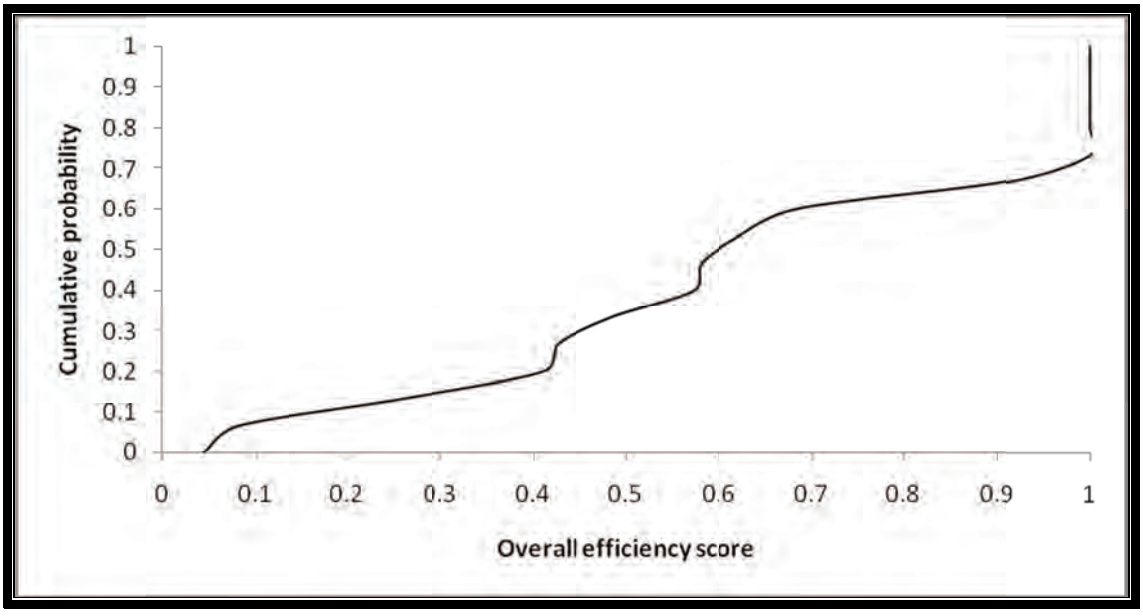

Figure 5. 13: Cumulative probability distribution of overall efficiency scores for vegetable producers from ZIS.

The distribution of overall efficiency scores shown in Figure 5.13 relates very much to that of the technical efficiency scores presented in Figure 5.9. The reason for the close resemblance is the

fact that all of the marketing efficiency scores are close to one. Since overall efficiency is the product of the technical and marketing efficiency, the technical efficiency scores are multiplied by between 0.9 and one.

The distribution of overall efficiency scores shown in Figure 5.13 suggests that about 50% of the respondents achieved an overall efficiency score of 0.57. Half of the respondents thus generated 57% or less of the revenue they could have produced from applying the respective production inputs. Overall, therefore, the levels of efficiency with which the respondents used their production inputs are low.

5.5.5 DISCUSSION AND CONCLUSIONS

Based on the analyses of all the different types of efficiency, the conclusion is that the majority of farmers from ZIS perform well below potential. Overall, their levels of efficiency prove to be relatively low. The low levels of technical efficiency suggest that the farmers do not produce the amount of outputs they should given the amounts of production inputs they use. Low levels of cost efficiency (allocative efficiency) imply that the farmers do not use those combinations of production inputs that will minimise their production costs. Thus, they do not produce on the expansion path. The production sub-DMU thus has some major scope to improve the levels of efficiency in order to contribute to improving the overall performance of the farmers. “Back to basics” training in irrigation water and crop management as recommended by Fanadzo *et al*. (2010) may potentially contribute significantly to increasing the crop yields of the farmers from ZIS.

On the other hand, the results show that the farmers are actually performing relatively well in the marketing sub-DMU. However, the small variation in the marketing efficiency scores may be a symptom of another problem faced by the farmers from ZIS. Keep in mind that the low variation in marketing efficiency scores implies that the farmers receive prices that are very similar from one farmer to the next. The low variation in the marketing efficiency score may be an indication that the farmers have very little influence on the price they receive for their produce. The conclusion that the farmers do not have to improve in terms of the marketing of their produce may thus be premature. The farmers should strive to increase their income by considering different marketing strategies. Collectively, the farmers from ZIS should consider establishing and promoting the brand of vegetables produced by farmers from ZIS. Existing policies such as the black economic empowerment policy aim to incentivise buyers to deal with emerging farmers. By ensuring that the volume and quality standards of produce sold under their brand are high, the farmers from ZIS will not struggle to find buyers for their crops and may also be able to increase the income they receive for their vegetables. The collective entity (ZCAC) should also consider adding value to the produce before selling it. Adding value to the produce may increase the income farmers receive for their vegetables.

When considering the fact that the farmers from ZIS are severely cash flow constrained, the reality that the farmers earned less than 60% of the revenue they could have earned from the inputs they have used is a cause for concern. Based on the analyses of all of the different types of efficiencies, it is evident that the major challenge faced by the farmers from ZIS relates to their inability to produce the maximum amount of vegetables from their current input levels. Given that the farmers from ZIS most likely will not be able to invest in the new technology that will be developed from government's investment in research and development that focus on developing improved technology (NDP, 2011), the poor performance of the farmers from ZIS is set to continue. Support structures thus should focus on assisting the ZIS farmers to use their inputs in such a way to allow them to generate the highest possible revenue from the inputs they apply within their current technology set. Although it still will not solve the major problem they face of not being able to apply the recommended input levels, it will allow them to earn the maximum possible benefit from their limited amounts of inputs.

In the next section, attention moves to the value chain within which the farmers from ZIS operate.

5.6 VALUE CHAIN MAPS FOR VEGETABLES

A value chain map for vegetables produced at ZIS contains important strategic information that can be used to support the farmers to overcome stumbling blocks that constrain their performance. First of all one has to understand the flow of the physical product from the input supplier to the end consumers. Then one has to understand the distribution of value as the product moves along the chain towards the consumer to see whether it is possible to distribute a greater share of the value to the emerging farmers under consideration. For the purpose of this study, the value chain map is also extended to include the volumes of fresh water that are used along the value chain to get the product to the end consumer. Ultimate the value of the water allocated to the farmers to enable them to produce the crop can be calculated.

5.6.1 FLOW OF VEGETABLES FROM INPUT SUPPLIERS TO THE END BUYER

Zanyokwe vegetable producers are a typical group of emerging farmers who are severely constrained by well documented supply side constraints. However, despite those constraints there are some farmers who do produce surplus vegetables that enter the vegetable value chain. The product flow map for Zanyokwe producers is shown in Figure 5.14.

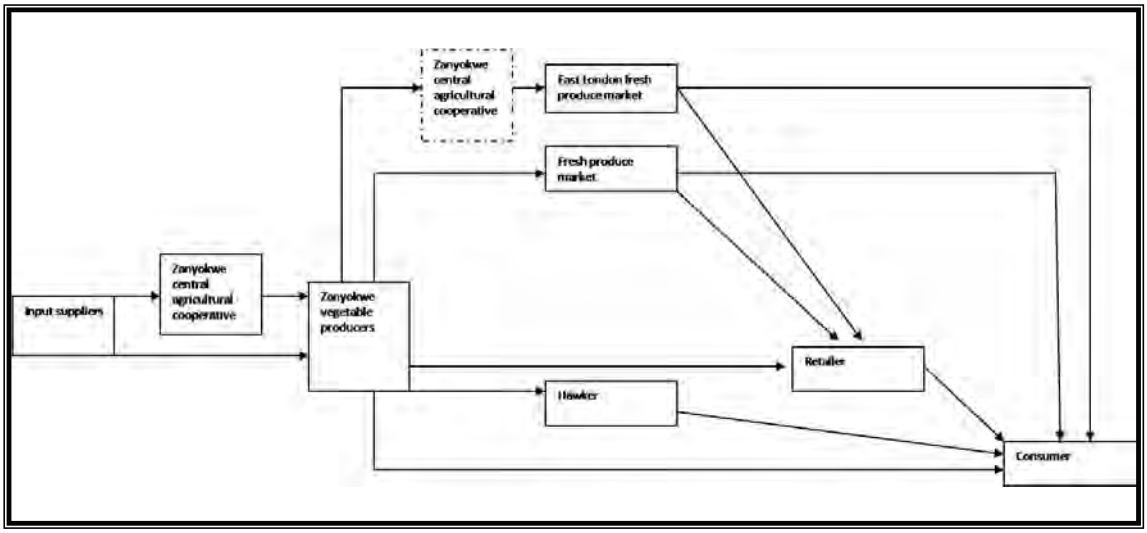

Figure 5. 14: Product flow map for vegetables produced by Zanyokwe producers.

Zanyokwe vegetable producers do not have their own separate value chain. They have to participate in the same value chain as commercial farmers in the region. They buy their inputs from the same suppliers and sell their produce to the same buyers as commercial farmers. Given the fact that they are considered to be emerging farmers (resource poor), it is a major challenge for them to compete with other commercial farmers who have the necessary means to produce sufficient surpluses of vegetables which can be sold to generate income.

Figure 5.14 shows that Zanyokwe producers typically obtain their inputs in two ways. The one way is to buy their inputs from the same input suppliers as commercial farmers, while some other inputs are also supplied by government through the Zanyokwe Central Agricultural Cooperative (ZCAC). Since Zanyokwe farmers typically have very small pieces of land, they need small amounts of inputs. Buying small volumes is not the preferable way to buy inputs since unit prices are higher when buying inputs in small volumes. The opportunity to buy inputs from the ZCAC allows individual farmers to obtain inputs at relatively lower prices.

On the farms, producers use the inputs to produce agricultural products. Most of the farmers in Zanyokwe produce vegetables. It is important to note that farmers have complete autonomy with regard to what product to produce, how to produce it and whom to sell it to. When moving downstream along the value chain, there are a number of different buyers for vegetables produced at Zanyokwe. Farmers can sell their vegetables to hawkers, retailers, fresh produce markets, and also to consumers in the community. A relatively new approach that became available to Zanyokwe producers is to sell their produce specifically to the East London fresh produce market (FPM) via the ZCAC. ZCAC sends a truck to the farms to collect produce. It then delivers the vegetables to the East London FPM. The interesting aspect of this transaction is that the FPM pays the money into the bank account of ZCAC who in turn pays the

individual farmers (Mbengezi, 2010). The ownership of the vegetables is not transferred to ZCAC as such.

A relatively large proportion of Zanyokwe vegetables are sold to hawkers. Vegetable producers from Zanyokwe tend to favour hawkers since the hawkers visit the farms with their trucks and buy the produce on the farm. Farmers thus don't have to go and look for buyers when selling their vegetables to hawkers. Some of the hawkers even bring their own workers to the farm to harvest the vegetables they buy from the farmers. The hawkers then sell the vegetables at different hawker stands to the final consumers in some of the bigger towns (i.e. Fort Beaufort, Alice, King William's Town) in the vicinity of the ZIS.

In addition to selling vegetables to hawkers, some vegetables produced by Zanyokwe farmers are also bought by retailers. Especially the larger retailers do have an incentive to procure from emerging farmers such as those from Zanyokwe by scoring BEE points for BEE procurement recognition (Easi BEE, 2012). As a matter of fact, Mbengezi (2009) mentioned that a procurement manager from a Pick 'n Pay store in East London recently contacted him in order to get the profile of Zanyokwe vegetable producers since they would like to procure from Zanyokwe producers in order to improve their BEE score. This seemed to be an opportunity that most definitely has to be exploited to get Zanyokwe producers to integrate into a mainstream agricultural value chain. However, the relationship has not yet materialised by the end of 2011. The benefit (BEE points) Pick 'n Pay would have received thus may have been too low to compensate for the substantial increase in transaction costs it would face when dealing with the farmers from ZIS. Thus, while there are incentives for private sector firms to deal with emerging farmers, the level of the incentive may be even more important to ensure that the buyer will benefit from such a relationship.

Farmers sell their vegetables individually to fresh produce markets (i.e. King William's Town, East London, Umtata, and Port Elizabeth) (Mbengezi, 2009). Some farmers also used agents in the past to sell their vegetables. The agents would take the vegetables and look for a buyer after which they would go back to the farmers and pay for the crop. However, some of those agents disappeared without paying the farmers, which caused the farmers to lose a lot of money (Mbengezi, 2009). Farmers nowadays are therefore more careful and are very reluctant to make use of agents to sell their vegetables. There may, however, still be some farmers who do use agents to find buyers for their crop. The last type of buyers to which Zanyokwe producers sell their vegetables are the members of the community. They too go to the fields and buy vegetables from the farmers on the farm. They, however, do not buy large quantities at a time.

From the above discussion, it is evident that Zanyokwe vegetable producers have a wide variety of buyers to whom they can sell their produce. In the next section, the attention shifts to the distribution of value along the respective value chains that are available to the vegetable producers from Zanyokwe.

5.6.2 *DISTRIBUTION OF VALUE ALONG THE VALUE CHAIN FOR VEGETABLES*

Based on discussions with the governmental extension officer at ZCAC, cabbage, carrots and beetroot were the predominant types of vegetables produced at ZIS in 2010. The collected data also confirm the predominance especially of cabbage and carrots. On average, sales of cabbages contributed about 76% of the total revenue generated from vegetable production, followed by carrots at about 21% and beetroot at two percent. Thus, for the purpose of quantifying the distribution of value along the value chains, only ·cabbage and carrots were considered. Zanyokwe farmers sell the different types of vegetables to the same buyers, hence one can draw a generic product flow map to show the different channels through which they sell their vegetables. The distribution of value, however, differs from crop to crop and hence should be considered separately.

Figure 5.15 shows the generic product flow map that represent the different marketing channels through which Zanyokwe farmers can sell their vegetables to reach the end consumer.

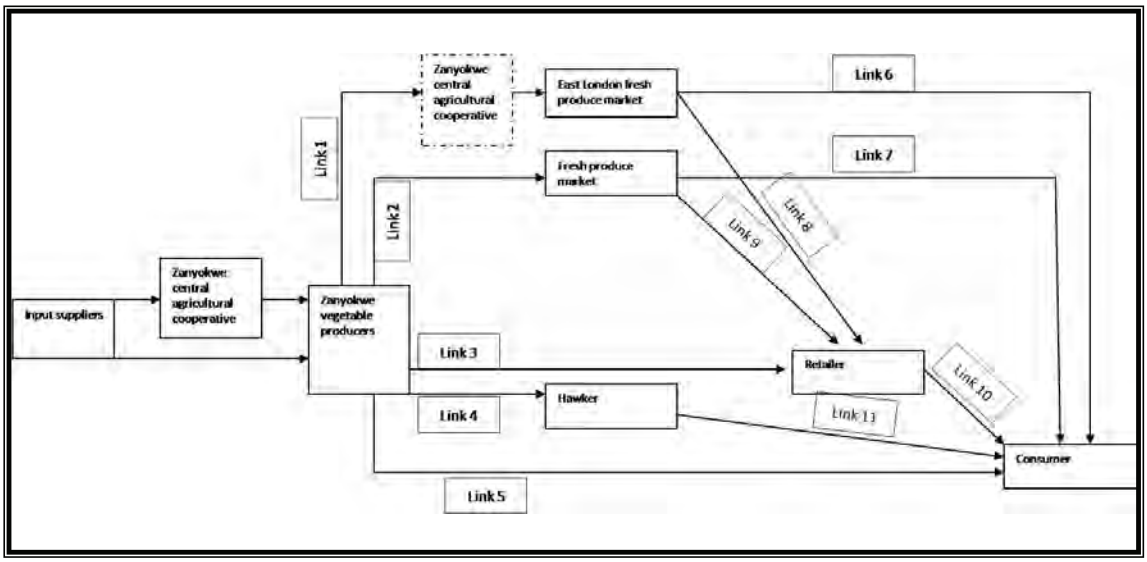

Figure 5. 15: Generic value chain map for vegetables produced by Zanyokwe farmers.

The price received for the produce has a direct impact on the value that is added in the respective nodes along the value chain. Each link specified in Figure 5.15 represents a transaction with a downstream buyer that may yield different prices for the product under consideration. The distribution of value via the respective links is discussed next.

5.6.2.1 Distribution of value along the value chain for cabbages produced at ZIS

Table 5.7 contains the gross revenue and gross margins (in 2011 prices) for a ton of cabbages at farm gate, and gross revenue and value added to a ton of cabbages at the final link before

the cabbages reach the end consumer via the respective marketing channels. The links included in Table 5.7 relate to the links shown in Figure 5.15. The gross revenue represents the total value product (price per ton multiplied by a ton of cabbages) of a ton of cabbages. The gross margin is calculated by subtracting the direct allocatable costs (including transport costs to the buyers and marketing fees where applicable) from the gross revenue. By implication, the gross margin is an indication of the value that is added on the farm.

Table 5. 7: Gross revenues and gross margins (in 2011 prices) of cabbage at farm gate, and gross revenue at the final link before the crops reach the end consumer via the respective marketing channels.

Marketing channel		Cabbage	
Farm gate		Gross revenue (R/tonne)	Gross margin (R/tonne)
Link 1	EL FPM[1]	2 518	1 002
Link 2	FPM[2]	2 518	1 082
Link 3	Retailer	2 665	1 526
Link 4	Hawker	2 665	1 587
Link 5	Consumer	2 518	1 441
Final link		Gross Revenue (R/tonne)	Value added (R/tonne)
Link 6	EL FPM[1]	2 896	378
Link 7	FPM[2]	2 896	378
Link 10	Retailer	2 958	293
Link 11	Hawker	5 330	2 665
Link 5	Consumer	2 518	0

Notes:

1: East London Fresh Produce Market

2: Fresh produce market at King William's Town

Table 5.7 shows that farmers earned the highest gross margin per tonne of cabbage when they sold the cabbages to hawkers (R1 587/tonne), followed by cabbages sold to retailers (R1 526/tonne), directly to community members (R1 440/tonne), King William's Town fresh produce market (R1 082/tonne) and East London Fresh Produce Market (R1 002/tonne) respectively. The most profitable marketing channels for cabbages produced on ZIS thus prove to be through hawkers and retail stores.

The lower gross margins associated with fresh produce markets are due both to higher costs (mainly transport costs) and lower prices paid by the fresh produce markets compared to hawkers and retail stores. While hawkers and retail stores both paid on average R2 665/tonne, the fresh produce markets paid on average about R2 518/tonne. When selling vegetables through fresh produce markets farmers also have to pay a market fee as well as agent commission. The market fees and agent commission add up to about 15% of the gross value of the sales through the fresh produce market. In addition to the increased marketing costs, farmers also have to pay the transport of the cabbages to King William's Town (about 40 km round trip) and East London (about 120 km round trip). Combined with the lower prices paid by

the fresh produce markets, the additional costs associated with selling the vegetables to the fresh produce markets have a major negative impact on the gross margins associated with the production of cabbages on ZIS.

Interestingly, despite the lower gross margins generated when selling the cabbages through the fresh produce markets, about 40% of the cabbages produced on ZIS are sold through the respective fresh produce markets. The main reason why the farmers continue to sell their cabbages to the fresh produce markets is that they can move larger volumes through the fresh produce market compared to hawkers and retail stores. Hawkers and retail stores have more stringent quality requirements and a more limited demand for cabbages. The farmers from Zanyokwe struggle to meet the quality requirements mainly due to the constraining impact of their limited cash flow. The lack of cash flow constrains their ability to apply sufficient levels of production inputs (i.e. fertiliser and chemicals) in a timely manner to ensure high volumes of good quality vegetables. Commercial vegetable producers argue that the timely application of fertiliser and pesticides are crucial for the production of a high volume of good quality vegetables. Given the current situation at Zanyokwe, farmers thus have limited scope for reducing the proportion of cabbages that are sold through the fresh produce markets.

When moving downstream along the value chain towards the end consumer, the different market actors were very reluctant to provide information on the cost structures associated with their business activities. The only information they were willing to provide was the price at which they sell the produce. The gross revenues for cabbage sold by the respective market agents were calculated from the prices and are also documented in Table 5.7. The highest gross revenue per ton of cabbage is earned by the hawkers. While they buy a ton of cabbage from farmers at R2 665/tonne, they sell the cabbages to consumers at hawker stands for R5 330/tonne. The hawkers thus add another R2 665/tonne to the cabbages they sell. It is important to note that the hawkers do not add value by physically transforming the cabbages into a different product. The bulk of the added value is in terms of place utility. The strategic location of the hawkers' stands proves to have a major impact on consumers' willingness to pay for the cabbages produced on ZIS.

The next highest gross revenue for a ton of cabbages is earned by retail stores. The retail stores earn on average gross revenue of R2 958/tonne for cabbages. Since the retail stores pay farmers a price of R2 665/tonne, the value that they add to the ton of cabbages adds up to R293/tonne. Again the retail stores do not physically transform the cabbages into a different product. Interestingly, despite earning the second highest gross revenue from the cabbages, the retailers add the lowest amount of value to the product before selling it to the buyers from the next level in the chain.

The fresh produce markets (both at King William's Town and East London) earn gross revenues of R2 896/tonne, which suggests that fresh produce markets added value of R378/tonne to the cabbages produced at ZIS. Similar to the hawkers and retail stores, the fresh produce markets do not physically transform the cabbages in the value adding processes. Table 5.8 provides a summary of the total value added to a ton of cabbages from the farm to the end consumer.

Table 5. 8: Summary of the total value (in 2011 prices) that is added to a ton of cabbages when reaching the final consumer.

Marketing channel	Cabbage
	Total value added (R/tonne)
EL FPM[1]	1 380
FPM[2]	1 460
Retailer	1 819
Hawker	4 252
Consumer	1 441

Notes:

1: East London Fresh Produce Market

2: Fresh produce market at King William's Town

Table 5.8 shows that the marketing channel via the hawkers adds by far the highest value to the cabbages produced at ZIS, followed by the channels via retail stores, King William's Town fresh produce market, directly to consumers, and the Fresh Produce Market at East London respectively. Both the gross margin and the total value added to cabbages are the highest when farmers sell their cabbages via hawkers. In addition to paying relatively high prices for cabbages, the marketing channel via the hawkers has some other benefits to the farmers that make the option attractive. Since hawkers collect the cabbages on the farms farmers do not have to pay transport costs to deliver the cabbages to their buyers. Some of the hawkers even take their own harvesting teams to the farms to ensure that they get access to the best quality cabbages that are available on the farms. Farmers consequently also benefit in terms of saving labour costs when selling cabbages to the hawkers. The main challenge associated with selling the cabbages to the hawkers, however, is the limited demand. Hawkers sell the cabbages from informal stands with no facilities to protect the shelf life of the cabbages. Without careful production planning and coordination amongst farmers, there is no way to move the bulk of the cabbages that are produced at ZIS via the hawkers.

The channel via the Fresh Produce Market at East London both generates the lowest gross margin for the farmers and also adds the lowest amount of value to the cabbages that move through the channel. Although the above figures may create the impression that selling the bulk of the cabbages through the fresh produce markets is a sub-optimal decision, the main attraction of the fresh produce market as a marketing channel is the ability to move larger volumes of cabbages through the fresh produce markets compared to the other channels.

Farmers are also able to move vegetables of a lesser quality through the fresh produce markets. Although the farmers do get lower prices for poor quality cabbages at fresh produce markets, buyers in the other channels do not buy poor quality cabbages at all. Thus, although the channel may seem to be the worst of the available alternatives, the benefits of the channel via the fresh produce market prove to be sufficient to convince the farmers to utilise that channel. The marketing channel where farmers sell the cabbages directly to the end consumers is also associated with low gross margins for the farmers and consequently low levels of total value added along the channel. Note, however, that only a small proportion of cabbages are sold directly to members of the community. The main attraction of this marketing channel is the benefit to community members who don't have to go to town to buy cabbages.

From the above it is evident that, although the financials of the decisions made by cabbage producers from ZIS may seem to be sub-optimal, the farmers do have strong reasons why they choose to sell their vegetables through the marketing channels they seem to prefer. The next section focus on the distribution of value of carrots as it moves from the farm to the end consumers.

5.6.2.2 Distribution of value along the value chain for carrots produced at ZIS

Similar to the case of cabbages, Table 5.9 contains the gross revenue and gross margins per ton of carrots at the farm level for the different marketing channels that are available to the carrot producers from ZIS, and the gross revenues and value added per ton of carrots along the different marketing channels towards the end consumer.

Table 5. 9: Gross revenues and gross margins (in 2011 prices) of carrots at farm gate, and gross revenue and value added at the final link before the crops reach the end consumer via the respective marketing channels.

Marketing channel		Carrots	
Farm gate		Gross revenue (R/tonne)	Gross margin (R/tonne)
Link 1	EL FPM[1]	2 333	992
Link 2	FPM[2]	2 333	1392
Link 3	Retailer	2 473	1531
Link 4	Hawker	2 500	1759
Link 5	Consumer	2 583	1842
Final link		Gross revenue (R/tonne)	Value added (R/tonne)
Link 6	EL FPM[1]	2 697	364
Link 7	FPM[2]	2 697	364
Link 10	Retailer	3 091	618
Link 11	Hawker	5 000	2 500
Link 5	Consumer	2 583	0

Notes:

1: East London Fresh Produce Market

2: Fresh produce market at King William's Town

Table 5.9 shows that the highest gross margin (R1 842/tonne) for carrots is generated when selling the carrots directly to the end consumer (community members). Again the community members go to the farmers on their farms to buy the carrots. When selling carrots directly to the members from the community the farmers incur no transport cost, nor any other marketing fees. Despite the high gross margin associated with selling carrots directly to community members, only about one percent of the carrots that are produced at ZIS are sold directly to community members. The main reason for the low proportion of carrots sold to the highest paying buyers is the limited levels of demand for carrots by the community members themselves.

The next highest gross margin is generated when selling the carrots to hawkers (R1 759/tonne), followed by retail stores (R1 531/tonne), and then the fresh produce markets at King William's Town (R1 392/tonne) and East London (R992/tonne) respectively. Interestingly, the bulk of the carrots from ZIS (about 45%) are sold to retail stores in King William's Town, while about 28% of the carrots are sold to fresh produce markets, and about 23% to hawkers. Given that almost 70% of the carrots are sold to the retail stores and hawkers who only buy good quality vegetables, there seems to be some evidence that the general quality of the carrots produced by farmers from ZIS produce is better compared to the cabbages they produce.

When moving downstream towards the buyers at the next level in the value chain, the gross revenue of carrots distributed through the hawkers are substantially higher than that in the other marketing channels. The carrots are not physically transformed during the value adding

activities downstream from the farm gate. Hawkers buy a ton of carrots from carrot producers at ZIS for R2 500/tonne and sell them to the end consumers in the surrounding towns for R5 000/tonne. The major component of the value that hawkers add to the carrots relates to place utility. The hawkers sell the carrots at stands that are convenient to the buyers which contribute to enhancing their willingness to pay for the carrots.

The next highest gross revenue and value adding is associated with carrots that are sold to retail stores. The gross revenue for a ton of cabbages sold by retail stores to the end consumer adds up to R3 091/tonne which implies an increase of R6 18/tonne in the value of the carrots. Again, the lowest gross revenues (R2 697/tonne) and value added (R364/tonne) are linked to the fresh produce markets.

Table 5.10 provides a summary of the total value that was added along the value chain till the point where the carrots reached the final consumers.

Table 5. 10: Summary of the total value (in 2011 prices) that is added to a tonne of carrots when reaching the final.

Marketing channel	Carrots
	Total value added (R/tonne)
EL FPM[1]	1 356
FPM[2]	1 756
Retailer	2 149
Hawker	4 259
Consumer	1 842

Notes:

1: East London Fresh Produce Market

2: Fresh produce market at King William's Town

Cumulatively, the marketing channel through the hawkers adds the highest value to a ton of carrots produced at ZIS. The total value added in the hawkers' marketing channel adds up to R4 259/tonne. The next highest value was added to carrots that were sold through retail stores (R2 149/tonne), followed by carrots that were directly sold to the community (R1 842/tonne). Again, the lowest amount of value added occurred via the fresh produce markets. The total value added along the channel via the fresh produce market in King William's Town adds up to R1 756/tonne and via the East London Fresh produce market, R1 356/tonne. Despite the relatively low levels of value added via the fresh produce markets, the fresh produce markets prove to be important market outlets for carrot producers from ZIS. Carrots of a lesser quality are marketed via the fresh produce markets, albeit at a lower price. The fresh produce markets also have the scope to accept the carrots that are in excess of the quantities demanded by the higher paying hawkers and retail stores.

Given the different amounts of value that are added through the respective marketing channels, the choice of marketing channel for cabbages and carrots has a direct impact on the value added per cubic meter of water that is used to produce the vegetables and ultimately deliver it to the end consumer. In the next section, the focus shifts to the volume of water used to provide consumers with cabbages and carrots given the different marketing channels available to the farmers from ZIS. The section concludes with the calculation of the value (financial) per cubic meter of water used along the whole value chain.

5.6.3 DISTRIBUTION OF WATER USE AT CRITICAL POINTS ALONG THE VALUE CHAIN

Water is used in agri-food chains both as a productive resource and as a production input. Farmers use water as a productive resource to irrigate their vegetables, and then also as a production input to dilute chemicals and to wash the vegetables before selling them. In none of the types of vegetables under consideration do any of the agents downstream along the value chain use water to add value to the vegetables before selling them. The water used on farms thus represents all the water used to produce the vegetables and to move them all along the value chain toward the final consumer. It is only at consumption that water again is used, however, for the purpose of this study the water use at consumption is not considered.

The volumes of water were determined by simulating the total irrigation requirement for each type of vegetable using SAPWAT (Van Heerden and Crosby, 2008). The simulated irrigation requirement also considers the rainfall, based on the long term average rainfall in the area. By implication, the simulated irrigation requirement refers to the gross volume of blue water required to produce the respective types of vegetables. In order to determine the total irrigation requirement the simulated irrigation requirement was divided by the yields obtained. The volumes of water required to produce one ton of cabbages and carrots are shown in Table 5.11.

Table 5. 11: Gross volumes of blue water required to produce one tonne of vegetables.

	Volume of water (m^3)	
	Cabbage	Carrots
Irrigation	763	273
Chemical	2	NA
Wash	NA	1.3
Downstream	NA	NA
Total water requirement	**765**	**274.3**

Based on the simulated irrigation water requirement and the yields obtained by cabbage farmers, cabbage producers at ZIS require a gross volume of 763 m^3 to produce one tonne of cabbages. Cabbages are prone to pests that need to be sprayed with pesticides. The farmers indicated that overall they use less than two cubic metres of water to dilute all the chemicals that are used to spray their cabbages. Cabbages are not washed before they is sold, nor do any of

the agents downstream along the value chain use any water in value adding activities as the cabbages move towards the end consumer. The total volume of blue water required to produce one ton of cabbages thus adds up to 765 m^3.

In order to produce one ton of carrots at ZIS, farmers require 273 m^3 of irrigation water. None of the farmers indicated that they used any chemicals on their carrots hence no water was used to dilute chemicals. Carrots need to be washed before they are sold. Although farmers do not measure the volume of water they use to wash the carrots, they argue that they can wash one bunch of carrots (1.5 kg) with two litres of water or less. The total requirement of fresh water to produce one ton of carrots is thus 275 m^3.

The next step is to link the volumes of fresh water that are used along the respective value chains to the value that is added in the chains in order to get an idea of the value of the water that was allocated to producing the different types of vegetables at ZIS. Table 5.12 shows the value of the water at farm level, and also by the time the vegetables reach the final consumer. At the farm level, the value of the water is expressed as the gross margin per cubic metre of water used on the farm to produce one tonne of the specific type of vegetable. The gross margin is calculated by subtracting the direct allocable variable cost from the revenue. The gross margin then is divided by the volume of water (in m^3) required to produce one tonne of the crop in order to get the gross margin per cubic metre of water used. It is noted that the gross margin per cubic metre of water as used in this study relates to the residual value of water, except for the fact that the opportunity cost of own resources were not considered (Young, 2005).

Table 5. 12: Gross margin (in 2011 prices) per cubic metre of water used to produce one tonne of vegetables, and cumulative value added per cubic metre of water used along the whole value chain.

Farm gate	**Marketing channel**	Gross margin per cubic meter of water (R/m^3)	
		Cabbages	Carrots
Link 1	EL FPM[1]	1.31	3.63
Link 2	FPM[2]	1.42	5.10
Link 3	Retailer	2.00	5.61
Link 4	Hawker	2.08	6.44
Link 5	Consumer	1.89	6.75
Final link	**Marketing channel**	Cumulative value added per cubic meter of water used along whole value chain (R/m^3)	
		Cabbages	Carrots
Link 6	EL FPM[1]	1.80	4.93
Link 7	FPM[2]	1.91	6.39
Link 10	Retailer	2.38	7.82
Link 11	Hawker	5.56	15.49
Link 5	Consumer	1.88	6.70

Notes:

1: East London Fresh Produce Market

2: Fresh produce market at King William's Town

As expected, the value of the water that was used to produce the vegetables and to deliver it to the end consumer depends on the choice of market channel. Moreover, there is a direct relationship between the value of the water and the value of the product in the respective marketing channel. The value of the water in the first stage where the farmer uses the water to produce the product and to deliver it to his buyer is the highest if the farmers sold the cabbages to a hawker. When selling cabbages to a hawker, the gross margin per cubic meter of water used is R2.08. The water used to produce the cabbages sold to retail stores is the second highest (R2.00/m^3) followed by the water used to produce cabbages sold directly to members of the community (R1.89/m^3). The gross margins of the water used to produce and sell cabbages via fresh produce markets are substantially lower (R 1.42/m^3 via King William's Town fresh produce market, and R1.31/m^3 via East London fresh produce market).

In order to calculate the value of the total volume of water that was used from the farm to the point where the product is delivered to the end consumer, the cumulative value added is divided by the total volume of water that is used along the chain. The cumulative value added per cubic meter of water used to produce and sell cabbages via the hawkers adds up to R5.56/m^3, which is more than double that of water used to produce and deliver cabbages to retailer stores (R2.38/m^3). The cumulative value of water used to produce and deliver cabbages to the fresh produce markets are R 1.91/m^3 (King William's Town) and R1.80/m^3 (East London).

The distribution and value of water used to produce carrots and deliver them to the end consumers follow a similar trend. The main difference is that the gross margin of the water used to produce and deliver carrots directly to the community (R6.75/m^3) is the highest, followed by the hawkers (R6.44/m^3), retail stores (R5.61/m^3) and the fresh produce markets at King William's Town (R5.10/m^3) and East London (R3.63/m^3) respectively.

Overall, the value added per cubic meter of water used in the channel via the hawkers (R15.49/m^3) is more than double the water used via retail stores (R7.82/m^3). Again the cumulative values added via the fresh produce markets at King William's Town (R6.39/m^3) and at East London (R4.93/m^3) are by far the lowest. When considering that the productive use of water implies that water has to be used for that use where the financial benefit is the greatest, the figures documented in Table 5.12 suggest that farmers who use water to produce vegetables to sell via fresh produce markets use water less productively. It is, however, not as straightforward as to just interpret the values. As mentioned above, the fresh produce markets are important market outlets for vegetable producers from Zanyokwe. Not all of the vegetables that are produced at ZIS meet the quality requirements of hawkers and retail stores. The fresh produce markets provide the farmers with opportunities also to sell vegetables of lesser quality, albeit at a reduced price. The lower value earned from selling vegetables of lesser quality via the fresh produce markets is still higher than a negative value that would have been earned if the produce could not be sold. Thus, although the values may give an indication of the value of

the water that was used for alternative uses, one needs to go into more detail before making recommendations that aim to improve the productivity of the water that is used in agriculture.

Recall that the idea behind providing emerging farmers with irrigation water is to contribute to enhancing the contribution of agriculture as a source of livelihood to the rural poor of South Africa in order to contribute to alleviating rural poverty. The level of success in such a strategy depends on the level of success with which the emerging farmers can profitably produce irrigated crops. In the next section, a brief description follows of the value chain influencers that affect the behaviour of the farmers and their transacting partners within the macro level of the value chain as described by Roduner (2003).

5.6.4 VALUE CHAIN INFLUENCERS AND SUPPORTERS

Those actors who are directly involved with transforming the physical product along the value chain as it moves from the farm to the end consumer (value chain players) do not operate in isolation. Following the recommendation by Roduner (2003), the analysis of the case of ZIS is extended to also include the value chain influencers and supporters at a macro and a meso level respectively.

5.6.4.1 Value chain influencers (Macro level)

The value chain influencers are all the rules and regulations that have to be met by the value chain players. The rules and regulations specified in the institutional environment are thus considered to be the value chain influencers.

In addition to all the laws that regulate the production and marketing of agricultural producers in general, the main influencers that determine the behaviour of the farmers from ZIS include the quality requirements for produce procured by buyers in the formal markets, the rules associated with cultural activities in the community, the constitution of ZCAC, and the rules associated with the initiative where ZCAC leverages the inputs sponsored by government to allow more farmers access to such inputs and at higher levels.

Each set of rules influences the behaviour of the farmers from ZIS in its own way. The formal rules and regulations have to be complied with in order to gain access to the commercial agri-food chains. Failure to comply will mean that their produce does not meet the requirements and hence cannot be sold to the buyers in the formal market. The informal rules associated with the cultural activities in the community are more norms and traditions than legally enforced rules and regulations. As discussed above, the same cultural norms influence the behaviour of some farmers positively by creating an incentive to produce efficiently to ensure having harvestable crop ready during periods of cultural activities. Other farmers perceive it as

a disincentive to produce due to the availability of ample food in the community. However, regardless of the direction of the influence, all of those rules and regulations influence the behaviour of the farmers. Next, the support structures that assist the farmers to comply with the rules and regulations are discussed.

5.6.4.2 Value chain supporters (Meso level)

A number of the rules that influence the behaviour of the farmers from ZIS are internally imposed on the farmers. Where applicable, the management of ZCAC supports the farmers to meet such requirements.

On the other hand, farmers from ZIS require more sophisticated support services to be able to comply with the rules and regulations that are imposed by external parties in terms of quality specifications and food safety requirements. Again the management committee of ZCAC plays a central role in supporting the farmers to comply with the requirements specified by the buyers. The management committee organises training sessions where the farmers are trained in certain aspects that will enable them to produce a higher volume of crop that will meet the requirements specified by the buyer in the commercial agri-food chain. Farmers who participate in other projects (i.e. the project of Potatoes South Africa and the paprika project) also receive support from technical advisors from those projects. The farmers receive real time support to ensure that they are able to produce a good quality crop. Previously, farmers also received support and assistance from technical advisors from Pick ‘n Pay during the period when Pick ‘n Pay procured vegetables from the farmers from ZIS.

When performing support services to the community, external organisations should guard against taking over the responsibility of the farmers, but rather ensure that the skills are transferred to the farmers. In 2010, for example, the farmers from ZIS received potato seed from Potatoes South Africa to plant. After a few months all the potatoes had not yet been planted. During a meeting of ZCAC some of the members argued that they had not received the promised support to plant the potatoes. One of the members of the management committee of ZCAC asked the farmers how many times they need to be trained in how to plant a potato. The argument was that by now the farmers should know how to plant potatoes and not use lack of training as an excuse for not cultivating the land. This example emphasises the importance of ensuring that the skills are transferred to the farmers rather than merely performing the activities on behalf of the farmers.

Despite the support services that are available to the farmers from ZIS, there still are a number of constraints to their ability to successfully participate in commercial agri-food chains. In the next section the critical points in the value chain are assessed in order to identify some leverage points that can be exploited to improve the performance of the farmers from ZIS.

5.7 ANALYSIS OF CRITICAL POINTS IN THE VALUE CHAIN

From the discussions above, it is evident that the farmers from ZIS do face a number of stumbling blocks that make it difficult for them to participate successfully in commercial agri-food chains with stringent volume and quality requirements. The aim of this section is to explore these stumbling blocks by means of a problem tree analysis. Again, the farming unit is divided into a production sub-DMU and a marketing sub-DMU for the purpose of the problem tree analysis. After the problem tree analysis of each sub-DMU, some potential leverage points are discussed that can be used to support the farmers to overcome the identified stumbling blocks.

5.7.1 PROBLEM TREE ANALYSIS OF PRODUCTION SUB-DECISION MAKING UNIT

From discussions with the governmental extension officer and some of the farmers at the Zanyokwe Irrigation Scheme, the main problem associated with the production of vegetables by Zanyokwe farmers is the low volume of good quality vegetables produced. The problem of low volume of vegetables is also very evident from the SCP analysis. The problem tree showing the causes of the low volume of good quality vegetables is shown in Figure 5.16 below.

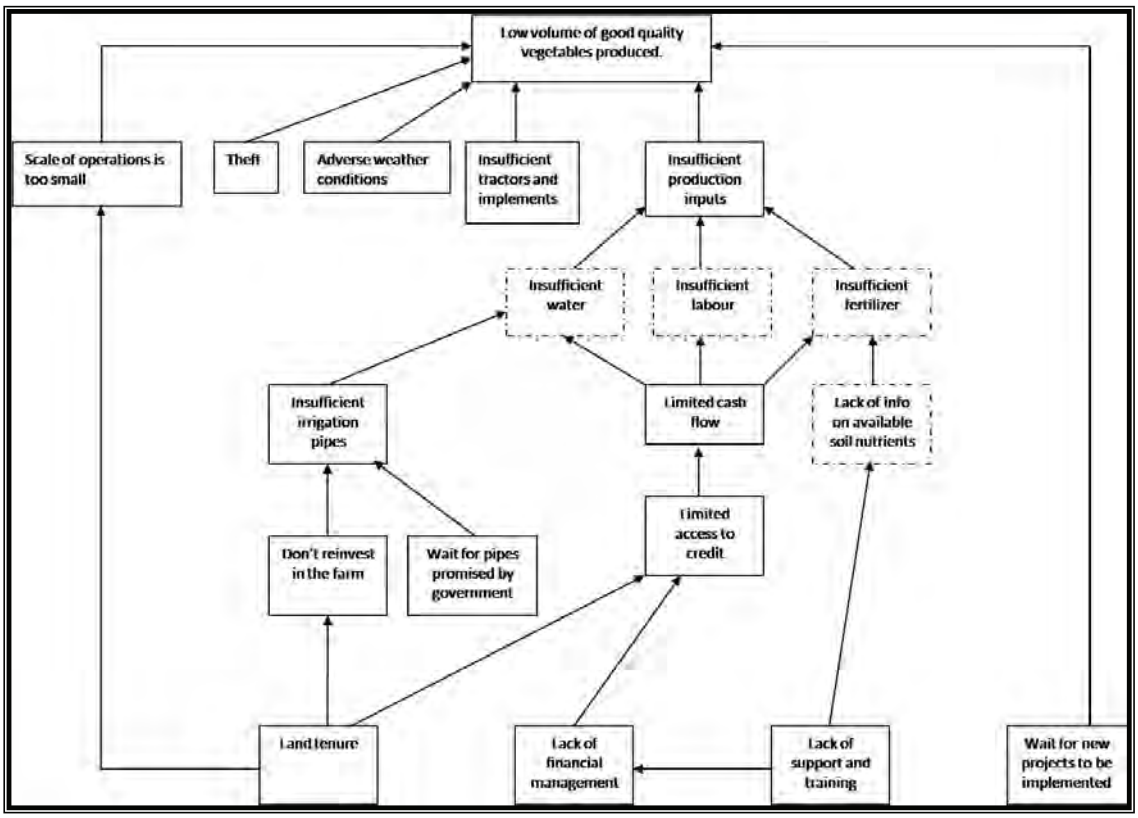

Figure 5. 16: Problem tree of the factors causing Zanyokwe vegetable producers to produce too small volumes of good quality vegetables.

Figure 5.16 shows that there are a number of reasons that cause farmers to produce too low volumes of good quality vegetables. First of all, the scale of operations is considered to be too small for individual farmers to produce a high volume of vegetables. Similar to other groups of emerging farmers in South Africa, farmers at Zanyokwe are considered to be resource poor. They farm on an average of less than three hectare of farmland. Similar to other groups of emerging farmers documented in the literature, a factor contributing to the small scale of production is the fact that most farmers do not have the title deeds for their land. Most Zanyokwe farmers have a PTO which gives them the right to occupy and cultivate the land. Not all farmers who have the PTOs do cultivate their land and, since they do not have the title deeds for the land they cannot sell or formally lease it to other farmers. While some of those farmers do allow other progressive farmers to cultivate the land, others are afraid that they may lose access to the land when they allow someone else to cultivate it. Allowing the progressive farmers to cultivate the land may seem to be a good solution, but it has happened that farmers who allowed progressive farmers to cultivate the land demanded the land back once they saw them generating a good income from it. The insecurity of tenure provides a disincentive for progressive farmers to invest time and other scarce resources in that land.

A second major cause for the low volume of good quality food produced by Zanyokwe farmers is the insufficient use of production inputs. Interviewees indicated that farmers tend to apply insufficient irrigation water, fertiliser or labour. Not all farmers have enough irrigation pipes to allow them to cultivate their whole farm at a time. Reasons for the lack of sufficient irrigation pipes include the fact that government has not yet delivered on a promise to give farmers more irrigation pipes, and farmers do not “plough back the money into their farms” (Mfundu, 2010). The lack of title deeds for their land was indicated to serve as a disincentive for farmers to invest their money in the farms. The lack of sufficient cash flow to pay for high electricity costs associated with pumping the water was listed as another cause for applying insufficient amounts of water. The high cost of pumping the water, however, is only a constraint in two of the six villages (Kamma Furrow and Lower Ngqumeya).

Insufficient application of fertiliser was also indicated as having a major constraining impact on the volume of vegetables produced. Again, lack of cash flow is the major contributor to insufficient fertiliser use. Another cause for insufficient fertiliser application is farmers’ lack of knowledge of the levels of nutrients that are available in their soils, and the nutrient requirements of different crops. Interviewees indicated that farmers are frustrated since people from different projects have already taken soil samples in the past, but they never got the results or feedback from those analyses. Interviewees indicated that there is a big need for training and support with regard to soil testing and the nutrient requirements of different crops.

Insufficient labour was listed as the last major cause for the insufficient application of production inputs. It was mentioned that projects that are implemented on the Zanyokwe Irrigation Scheme

often pay farmers and other community members to work in the fields for the duration of the projects. It has happened in the past that the wages paid by such projects are higher than the market wages in the region. Community members are thus unwilling to work in the farmers' fields for the lower wages. The lack of cash flow means that farmers cannot afford to compete with those projects in terms of wages. Farmers consequently struggle to get a sufficient number of people to work in their fields.

From the above discussions, the central role played by the lack of sufficient cash flow as a major stumbling block that constrains the performance of Zanyokwe vegetable producers is evident. As a matter of fact, 13 of the 23 respondents listed a lack of cash flow and/or capital as a weakness of their farm businesses. The lack of sufficient cash flow has a negative effect on the volume of vegetables produced, which in turn again has a negative effect on the cash flow generated by farmers. Zanyokwe farmers thus seem to be trapped in a downward spiral if the status quo persists. The problem of the lack of sufficient cash flow, again, is generic to most emerging farmer projects in South Africa. Similar to other emerging farmers, Zanyokwe farmers typically do not have access to credit since they do not have the required collateral (title deeds for their land) for obtaining formal credit, nor do they perform financial management to such an extent as to convince credit providers to award them credit to finance production activities. Support and training in financial management was identified as the main reasons why farmers' financial management is insufficient.

An interesting cause for the low volume of vegetables produced that was identified from discussions with the prominent farmers is the number of cropping projects implemented at Zanyokwe Irrigation Scheme. While one might expect that cropping projects should assist farmers to produce high volumes of good quality crops, the reality is that farmers are waiting for new projects to be implemented on their farms. While waiting for the new projects, farmers do not cultivate their land. As a case in point, some farmers were promised that a new cropping project would be implemented by September 2010. By mid-November 2010, however, the project had still not been implemented. Since the farmers were still waiting for the project, they had not planted anything and consequently also missed out on a profitable marketing window period over the festive season. It is noted that cropping projects *per se* are not considered to be a stumbling block. The projects, however, may have created a "dependency culture" (Mbengezi, 2009) amongst some farmers in the Zanyokwe Irrigation Scheme.

Insufficient numbers of tractors and implements was also identified as a major stumbling block from the questionnaire survey. Zanyokwe farmers do not own their own tractors or implements and currently farmers get access to the implements of ZCAC on a first-come first-served basis. A potential drawback of such a system is that tractors may spend a lot of time travelling from one farmer to the next, rather than being in the fields performing the necessary activities. A number of respondents indicated that they sometimes have to wait long periods before getting access to the tractors and implements of ZCAC. The importance given to tractors and

implements may also be related to the problems farmers face with regard to labour. Farmers need to mechanise to overcome the problems they face associated with manual labour. Unfortunately, the available tractors and implements are deemed to be insufficient to service all farmers in a timely manner. The value individual farmers place upon the tractors and implements is also evident from respondents' responses when asked what they think a successful farmer looks like, and what they would ask government if they could ask government anything they like. Six of the respondents indicated that they would consider farmers with their own tractors and implements to be successful, and also six farmers (only two of them also indicated that successful farmers own their own tractors and implements) indicated that they would ask government for their own tractors and implements. The frustration of farmers with regard to tractors and implements was very evident during the interviews.

Adverse weather conditions, especially hail storms, were also identified as a stumbling block that inhibits individual farmers' ability to produce a high volume of good quality vegetables. Nine of the respondents listed adverse weather conditions (specifying hail storms) as a threat to their farm businesses. It is important to mention that the Zanyokwe irrigation scheme was struck by a severe hail storm four weeks prior to the survey. A large number of farmers suffered severe damages from the storm. It may be possible that the importance awarded to the role played by adverse weather conditions may be inflated by the recent bad experience.

Theft was identified as the last cause for low volumes of vegetables produced by Zanyokwe farmers. Only four farmers listed theft as a threat to their farm businesses, which may be an indication that theft is not that big a threat to the typical Zanyokwe vegetable producer. Interestingly, those farmers who listed theft as a threat live relatively far from their fields.

From the above discussion, it may be concluded that Zanyokwe vegetable producers do face a number of challenges that make it difficult for them to produce high volumes of good quality vegetables. Failing to produce high volumes of good quality vegetables has some serious implications with regard to their ability to participate in high paying commercial value chains. The next section covers a discussion of some leverage points that may contribute to Zanyokwe farmers overcoming the stumbling blocks discussed above.

5.7.2 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING VEGETABLE PRODUCTION

From the discussion of above, the limited cash flow of the respondents proves to be central to most of the stumbling blocks faced by Zanyokwe vegetable producers. It creates the impression that, if one can assist the farmers to ensure a sufficient cash flow, one would really contribute to them being able to produce sufficient volumes of good quality vegetables that will allow them to farm in a financial sustainable manner. The problems associated with land tenure are

institutional of nature and hence more of a challenge to overcome. Secure property rights of their land will contribute to creating an enabling environment to the more progressive farmers to allow them to enhance their performance. Government thus should comply with its commitment to increase the pace of tenure reform (NDP, 2011; CRDP, 2009) to ensure that emerging farmer in the rural areas do have secure tenure. Again, transferring title deeds to individual farmers comes with the risk that farmers may lose their land when using it as collateral to obtain commercial credit. Transferring the title deeds thus should be accompanied with sound support and education of the farmers.

A potential leverage point to assist farmers to get access to credit and hence ensure sufficient cash flow is to support and train farmers in financial management. Sound business plans and financial statements that will prove to commercial credit providers that the farmers will be able to repay their loans may convince them to provide Zanyokwe farmers with credit. Obtaining credit may give Zanyokwe farmers adequate cash flow to ensure the timely and sufficient application of the necessary production inputs. According to Mbengezi (2009), there was a project in the past where business plans were compiled for vegetables produced at Zanyokwe. Zanyokwe farmers, however, never received the completed business plans. Training farmers to do their own financial statements will also take some time. An option can be first to compile financial statements for all Zanyokwe farmers to get the process of sound financial management under way. Once they start see the benefits of sound financial management, farmers may become more willing to learn how to compile the statements themselves. Training then can be done on a one-on-one basis using each farmer's own information, which may increase the rate of success of such training. The Mafisa financing scheme introduced by CRDP (2009) may also contribute to overcoming the credit constraint faced by the farmers from ZIS.

In order to overcome the challenge of timely and sufficient application of inputs, ZCAC, has recently implemented another initiative through which they assist farmers by giving them timely access to necessary inputs. Government supplies a large proportion of the necessary inputs. These are delivered to ZCAC, where individual farmers can go to get the inputs they require. Since the provided inputs are not enough for all farmers in the scheme, the new initiative from ZCAC is to invoice farmers for the inputs they use, although they have received it for free from government. The income generated through the initiative is used to buy more inputs to ensure that there are enough inputs for all farmers at Zanyokwe to get timely access to the inputs. The arrangement was agreed upon by farmers at a meeting organised by ZCAC. Whenever farmers follow the channel through which ZCAC sells their produce on their behalf to the East London FPM, ZCAC deducts 30% of the income and transport costs and then pay only the balance to the farmer. The deduction is made until the farmer has paid the required amount for the inputs that have been used. The arrangement is not that easy to enforce and creates an incentive for strategic default by which the farmers sell their produce to other buyers without disclosing the actual income that was generated. Farmers selling their produce via different channels are

required to pay themselves. Mbengezi (2010), however, argues that most farmers tend to pay their dues.

Another potential leverage point is to support Zanyokwe farmers by getting their soil tested to determine the levels of the different nutrients available in the soil. Farmers currently apply standard fertiliser mixes as recommended for different crops. Interviewees argued that knowing the content of the different nutrients in their soil may enable them to apply the correct amounts of the correct type of fertiliser to ensure an optimal crop. Thus, farmers believe that they will be able to use their resources optimally, as recommended by CRDP (2009), if they knew the specific fertiliser requirements for their crops. Again, interviewees indicated that soil samples were taken a number of times in previous projects from the farms without them getting the results of the tests. All interviewees indicated that, knowing the content of the different nutrients in their soil, will enable them to produce higher volumes of vegetables.

It was also mentioned that, although farmers know how to produce vegetables, most farmers still lack the skills to consistently produce a high quality crop. It was argued that lack of training in the physical aspects of vegetable production proves to be another stumbling block faced by Zanyokwe vegetable producers. Training and support thus seems to be a major leverage point to assist farmers in overcoming their major stumbling blocks that prevent them from producing consistently high volumes of good quality crops.

The last potential leverage point in the case of Zanyokwe vegetable producers is to rethink the success criteria for projects aimed at assisting emerging farmers to improve their production levels. Interviewees' concerns that important information generated by the projects fails to get back to them suggest that more emphasis should be placed upon transferring the generated knowledge in such a way that individual farmers may benefit from it. Incentivising projects at smallholder irrigation schemes *per se* thus is not the solution to the problem of rural poverty. If the skills are not properly transferred to the farmers, the initiative will not be sustainable after the project team extracts from the scheme after the completion of the project. Such a situation rather creates a dependency among emerging farmers on new projects.

In the next section, the emphasis shifts to the marketing sub-decision making unit in the farm business. The stumbling blocks that constrain Zanyokwe vegetable producers to make more money from their vegetables are discussed next in the problem tree analysis of the marketing sub-DMU.

5.7.3 PROBLEM TREE ANALYSIS OF MARKETING SUB-DECISION MAKING UNIT

The major problem facing the marketing sub decision making unit of Zanyokwe vegetable producers is the fact that farmers do not earn sufficient income from their produce to sustainably

finance their production inputs and other living expenses. A schematic representation of the problem tree associated with marketing their produce is shown in Figure 5.17.

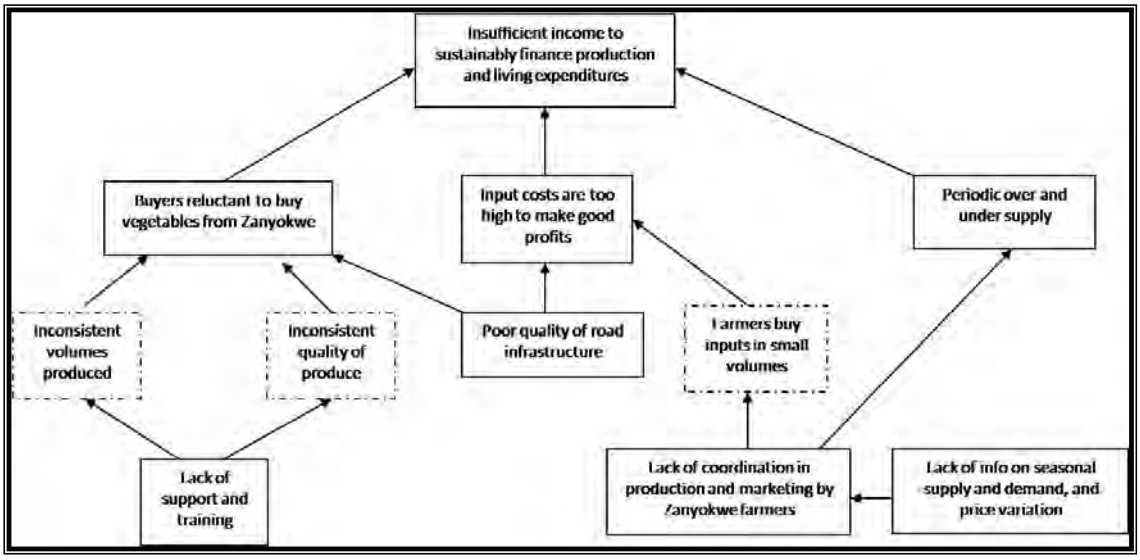

Figure 5. 17: Problem tree of factors causing Zanyokwe farmers to earn insufficient income to finance production and living expenditures.

Again Figure 5.17 shows that there are three main stumbling blocks that prevent Zanyokwe farmers earning a sufficient income to finance production activities and living expenses. Firstly, buyers are reluctant to buy vegetables from Zanyokwe farmers. The major concern of buyers who want to deal with Zanyokwe farmers is the inconsistency in supply of good quality vegetables. All of the buyers who were interviewed indicated that they were more than willing to buy vegetables from Zanyokwe farmers if the quality was good enough and if the farmers could assure them that their shelves will not be empty. Individual farmers on an average of 3 ha of land cannot possibly supply vegetables consistently throughout the year. The inconsistency of the volumes of vegetables produced and the quality of vegetables produced at Zanyokwe was also listed as the major reasons why buyers are reluctant to buy from Zanyokwe producers in the interviews with key role-players in the Zanyokwe Irrigation Scheme. Interviewees argued that a lack of support and training contributes substantially to the inconsistency in volumes and quality of vegetables produced. A secondary problem faced by the few farmers who do produce good quality vegetables is the fact that farmers who do not produce good quality vegetables damage the Zanyokwe brand. It causes buyers to be reluctant to buy from farmers who are from the Zanyokwe Irrigation Scheme.

The poor condition of the road infrastructure at the Zanyokwe Irrigation Scheme also contributes to buyers not wanting to buy from the Zanyokwe farmers. As a case in point, a retail store from East London had an agreement with Zanyokwe farmers that it will collect the vegetables from the farms. Due to the poor quality of the roads it stopped collecting from the farms and hence the Zanyokwe farmers missed out on the marketing opportunity. Zanyokwe farmers now have to

deliver their vegetables themselves. In addition to the general poor condition of the roads on the scheme, one has to drive through the river, or across a low water bridge to get to the farmers. If the river rises too much the truck cannot reach the farmers which leave the farmers stranded on an island. The poor condition of the roads also contributes to the second major cause for insufficient income that is generated. It increases the input cost by increasing the transport cost for the farmers. Increasing input costs puts pressure on profit margins. Input costs are also high since the small scale of operations means that farmers require small amounts of the inputs. Buying small amounts of inputs prevent Zanyokwe farmers from benefiting from buying in bulk. The lack of coordination between farmers with regard to production activities was identified as a reason why farmers still have to buy inputs in small volumes rather than collective buying in bulk.

The nature of most of the types of vegetables produced at Zanyokwe is such that it needs to be harvested as soon as it is ready to be harvested. The lack of coordination between farmers lead to a number of farmers harvesting at the same time which in turn leads to periods of severe oversupply and other periods of undersupply. Periods when lots of farmers harvest simultaneously leads to farmers competing with each other for buyers by accepting lower prices than their neighbours. Such periods of oversupply have downward pressure on prices and hence income generated from vegetable production at Zanyokwe Irrigation Scheme. On the contrary, in periods when prices are high, few farmers have vegetables that are ready to be harvested. Consequently Zanyokwe farmers fail to benefit from periods of high prices. A reason identified for the lack of coordination is the lack of information on seasonal supply and demand and the seasonal behaviour of vegetable prices.

The poor quality of the road infrastructure, the lack of support and training, and the lack of coordination between farmers seem to be the roots of the major stumbling blocks that constrain Zanyokwe vegetable producers from earning higher income from their vegetables. The next section focuses on potential leverage points that may contribute to Zanyokwe farmers overcoming the stumbling blocks discussed in this section.

5.7.4 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING VEGETABLE MARKETING

Although the poor condition of the road infrastructure was identified as a major stumbling block that affects the marketing performance and hence the income of Zanyokwe farmers, improving the quality of the roads on the scheme is a service that needs to be delivered by government. One needs to get in contact with the relevant governmental department(s) and convince them of the importance of delivering the service. In order to overcome the problem that buyers do not want to collect the produce from the farms anymore, ZCAC has started to transport the

vegetables on behalf of the farmers using trucks that were donated to ZCAC. The problem of increasing transport costs due to the poor condition of the roads still remains, however.

Providing support and training in the production of high volumes of good quality vegetables is an aspect that needs attention. Once Zanyokwe farmers can improve the consistency of their volumes and quality of produce, it will reduce the transaction costs faced by the buyers. Consequently, given the incentives through Black Economic Empowerment (BEE), it may convince buyers to buy from Zanyokwe farmers rather than other commercial farmers in the region. It may even become worthwhile again for some buyers to collect vegetables from the farmers' farms, which will reduce transport costs for Zanyokwe farmers. The interviewees really stressed the need for training and support to overcome the problem of inconsistency in volumes and quality of produce.

Facilitating coordination in the production and marketing of vegetables by Zanyokwe farmers may also be a leverage point to improve the income farmers earn from their vegetables. As a matter of fact, ZCAC is currently advocating more coordination in the production and marketing of vegetables on the Zanyokwe Irrigation Scheme. In order to promote coordinated marketing, an existing shed was converted to a packhouse with a coolroom. The idea is that the ZCAC's trucks collect the vegetables on the farms, take them to the packhouse and store them in the coolroom till the volume of vegetables is sufficient to justify a load to be delivered. Farmers are starting to make use of the facility.

Coordination in the production of vegetables is more of a challenge. Farmers have complete autonomy with regard to what crops to plant, and when to plant. An initiative from ZCAC to try to get farmers to coordinate production is to manage the planting material donated to them. Instead of dishing out the seedlings and/or seed to everybody, ZCAC tries to manage the material to ensure that there will not be periods of oversupply and undersupply. It also requires the farmers first to prepare the land before they can get the planting material. This is done to prevent farmers who are not serious about producing a crop to take the planting material and hence deprive another farmer from benefiting from the donated planting material.

The last potential leverage point based on the problem tree analysis of the marketing sub-decision making unit of Zanyokwe vegetable producers is the provision of information on seasonal supply and demand and prices. Of course it does not help to phone a farmer in the morning and tell him that the price for a specific crop is high. It takes in the region of three months to produce a crop. Farmers need the information at the time they have to plant their crops. Although one will not be able to forecast the price for a specific day, plotting average monthly prices for different crops over a number of years may provide useful information with regard to the seasonal behaviour of prices. Farmers can then use such information to decide

what crops to plant and when to plant, to increase the probability of getting higher prices for their produce.

With regard to price information that farmers can use at harvest to determine who to sells the produce to, the buyers who were interviewed indicated that they will not be able to indicate the price they will pay for the crop over the phone without seeing the crop since the quality is the major determinant of the price. The buyers, however, said that they would be willing to say what they sell their vegetables for. One can transfer such information to the farmers to help them decide to whom to sell the vegetables. Since the quality will still determine the price, one way to transfer such price information is to put up a notice board at the offices of ZCAC which contains the names of the different vegetables currently produced on the scheme, a picture of a good quality and a bad quality example of the different crops, and the prices for the respective qualities of the different crops. The prices should be adjusted for transport costs and a reasonable profit margin since buyers will only provide their selling prices for the crops. Farmers then can visually compare the quality of their vegetables to that of the examples to get an idea of what price to expect for their crops. The accuracy of the transport costs and profit margins that are used to estimate the price will be very important in such an information system.

From discussions with the interviewees, the need for information, support and training was stressed numerous times. Also from discussions with respondents in the questionnaire survey, one could sense that the farmers feel for a need for training. Providing information, support and training thus forms part of the potential leverage points to assist Zanyokwe farmers to overcome the stumbling blocks that constrain them from making sufficient income to sustainably finance their production activities and living expenses. The findings from this study thus prove that the emphasis placed on skills improvement in the new initiatives of government through the National Development Plan (NDP, 2011) and the Comprehensive Rural Development Programme (CRDP, 2009), is a step in the right direction. Since it is recognised that government cannot take the responsibility for all training and skills transfers to emerging farmers, government should rather explore potential incentives that will get private sector on board in terms of providing training. Again, the best incentive would be if government could create a complementary relationship between private sector firms and emerging farmers to give such firms a vested interest in the performance of emerging farmers. Such an incentive would mean that the private sector firm will actively contribute to improving the skills of the farmers in order to get access to the incentives. The discussion of the potential leverage points concludes the problem tree analysis of Zanyokwe vegetable producers.

In the next section, the focus shifts to the potential impact of implementing corrective measures, or overcoming some of the constraints.

5.8 MODELLING POTENTIAL BENEFITS FROM INTERVENTIONS TO OVERCOME STUMBLING BLOCKS

From the problem tree analysis, it is evident that the lack of cash flow is a major constraint to irrigation farmers from ZIS. The production of vegetables requires the timely application of sufficient levels of production inputs to ensure that an optimal crop is produced. The ability of the farmer to buy sufficient volumes of the necessary inputs to allow for the timely application thereof depends very much on the cash flow position of the farmer. Farmers from Zanyokwe do not have the title deeds to their land, nor do they own other assets that can be used as collateral to obtain formal credit. The farmers also typically do not have bank accounts that can serve as records to commercial banks to provide evidence of the farmers' ability to service overdrafts on their bank accounts.

The aim of this section is to apply the cash flow optimisation model to model the potential impacts of recommended changes on the performance of the farmers. First, some adjustments were made to the cash flow optimisation model to accurately represent the situation at Zanyokwe. The modifications are discussed next, followed by the assumptions that underlie the model.

5.8.1 ASSUMPTIONS UNDERLYING THE CASH FLOW OPTIMISATION MODEL FOR THE CASE OF VEGETABLE PRODUCERS FROM ZANYOKWE IRRIGATION SCHEME

In order to represent the current situation at ZIS, the model was adjusted to take into account the initiative where ZCAC sell inputs at zero percent interest to the farmers. In order to model the potential impact of some institutional changes, the model was also adjusted to allow for a price premium to be paid for produce from ZIS, and access to credit facilities.

- Inputs supplied by Zanyokwe Central Agricultural Cooperative

ZCAC has started an initiative where they sell the inputs supplied by government to the farmers instead of giving it to farmers as hand-outs. The reasoning behind the initiative is that the inputs supplied by government are insufficient to enable all farmers to apply the recommended levels of inputs. The co-operative has decided that if the farmers pay for the inputs, they can generate some funds to buy extra inputs. ZCAC is thus leveraging the initial amounts of inputs provided by government to try to get more inputs to enable the farmers to use the recommended input levels. The farmers buy the inputs on their co-operative accounts (at zero percent interest) which reduces the pressure on their cash flow in the months before their crop is harvested and sold. The farmers are expected to pay at least 30% of each load of vegetables sold till the point where their co-op accounts have been serviced. Farmers who do not pay their accounts are not allowed to buy additional inputs on their accounts. The model has been adjusted to allow for an interest free co-op account that allows farmers to buy inputs despite the cash flow constraint.

Since the co-operative only received enough inputs to allow farmers to apply about 40% of the recommended levels, the model was also adjusted to allow farmers only to buy 40% of the recommend input levels from the co-op.

- Price premium

Currently, Zanyokwe farmers receive government assistance by means of the inputs supplied to ZCAC. The model was adjusted to also include a price premium to model the potential impact of a premium to be paid for good quality vegetables sold in the formal market (mimicking the fair-trade premium) as a means to incentivise production. The idea is to compare the effects of push factor incentives (handouts) to those of pull factor incentives (farmers have to produce to get access to the incentives).

- DMU representing recommended input levels

In addition to the actual respondents from Zanyokwe, an additional respondent was created, based on recommended input and output levels. The respondent was given the recommended input levels, and the estimated yield (average level) based on the recommended input use. The idea is to include a "text book case" as a reference for the actual respondents, to stimulate them to use higher levels of inputs once the constraints have been removed. The inclusion of the "text book case" also gives an indication of what the respondents could potentially have earned if they had applied the recommended input levels and generated an average yield.

The net cash flow is optimised for the vegetable producers from ZIS to better understand their current cash flow positions, and their ability to exploit potentially profitable opportunities. Thereafter the impact of some proposed changes are modelled to determine the influence of such initiatives on the net cash flow of vegetable producers from ZIS.

For the purpose of modelling the cash flow of vegetable producers from Zanyokwe some assumptions were made. It is assumed that:

- The year under consideration starts on the first of January. Farmers from Zanyokwe indicated that little or no farming activities are taking place from the latter part of November through December, since that is the time when the young men go to initiation schools and other family members who work at the mines get home for the holidays. At the beginning of January, the farmers start planting to be in the market by the end of March when prices typically are high.
- The farmers do not have access to overdraft facilities from the bank.
- The farmers do not have access to formal credit since they do not have credible credit records with formal lending institutions, nor do they have the title deeds for their land to allow them to use the land as collateral to obtain credit.
- Farmers have to pay the outstanding balance in their ZCAC accounts for the inputs they have bought to allow them to utilise the initiative again in the next year.

- Farmers start the first period with R2 000 cash since they have to pay for all of their living expenditures in the initial two months prior to the first harvest.
- Zanyokwe vegetable producers sell 40% of their crops to fresh produce markets, 27% to hawkers, 19% of their cabbages to members from the community, and 14% to retail stores in King William's Town and other surround towns.
- On average, the living expenses of vegetable producers from Zanyokwe are R1 351 per month. The living expenses are expressed pro rata, based on the contribution of cabbage sales to gross revenue from vegetable production.
- Other income (i.e. grants, off farm economic activities, and income from other household members) adds up to R904 per month. Again, the other income is expressed pro rata, based on the contribution of cabbage sales to gross revenue from vegetable production.

In the next section, some of the results from the model are presented and discussed.

5.8.2 RESULTS FROM CASH FLOW OPTIMISATION MODEL FOR RESPECTIVE SCENARIOS

The model was first used to model the current situation at ZIS (base scenario), after which five alternative scenarios were modelled to determine the potential impact of implementing the recommended solutions at ZIS. The first scenario represents a situation where the farmers are operating in similar circumstances to the base scenario, but they use their inputs in a technically efficient manner. In the second scenario, the farmers are forced to intensify their production activities by using 50% more production inputs, while the third scenario, again, forces farmers to use 50% more inputs, but they also get access to credit to finance the additional inputs. The fourth scenario is a situation where the farmers have access to credit, use 50% more production inputs, and also receive a price premium of five percent instead of getting inputs through ZCAC. The last scenario is a case where ZCAC actually dish out the inputs to the farmers without farmers having to pay for them as intended by government.

5.8.2.1 Base scenario

The base scenario represents the current situation at ZIS. The average net cash flow of the respondents under the current conditions is about R505/ha (in 2011 prices). Their living expenses and additional income are already considered when modelling the net cash flow. On average, the farmers from Zanyokwe thus do not generate a lot of surplus cash to use to start their production activities in the following season. When going into more detail with regard to the net cash flow of the individual farmers, the situation appears worse. Given the current situation and the above assumptions, only three of the 11 respondents have positive net cash flows. Eight of the respondents were unable to generate positive net cash flow, with five of them also generating negative gross margins. A negative gross margin means that the farmers are not even able to cover the direct allocatable costs associated with producing their cabbages. Since

the model forces the respondents to repay their ZCAC account at the end of the year, farmers with negative gross margins are unable to generate positive net cash flows and hence their operations are deemed to be unfeasible. The large number of farmers who are modelled to be unfeasible confirms the arguments by farmers that a lack of cash flow is the major constraint that hinders their ability to improve their livelihoods by producing vegetables.

A stoplight chart (Figure 5.18) is drawn from the modelled net cash flows of the current situation to get a better understanding of the current performance of the farmers. For the purpose of the stoplight chart, a lower limit was set at 0 to show the proportion of the farmers who generate negative cash flow. Those farmers with net cash flows below the lower limit are represented by the red region. The upper limit for the stoplight chart is 5 787 which represents 50% of the direct allocatable costs (for water, labour and fertiliser) given the recommended input levels. Farmers who generate a net cash flow greater than 5 787 will be able to pay a substantial proportion of the required production inputs with existing funds which may allow them to apply the inputs at the recommended levels. Those farmers who are generating net cash flow greater than the upper limit are represented by the green region. The proportion of farmers who generate net cash flow between the lower and upper limits is represented by the yellow region.

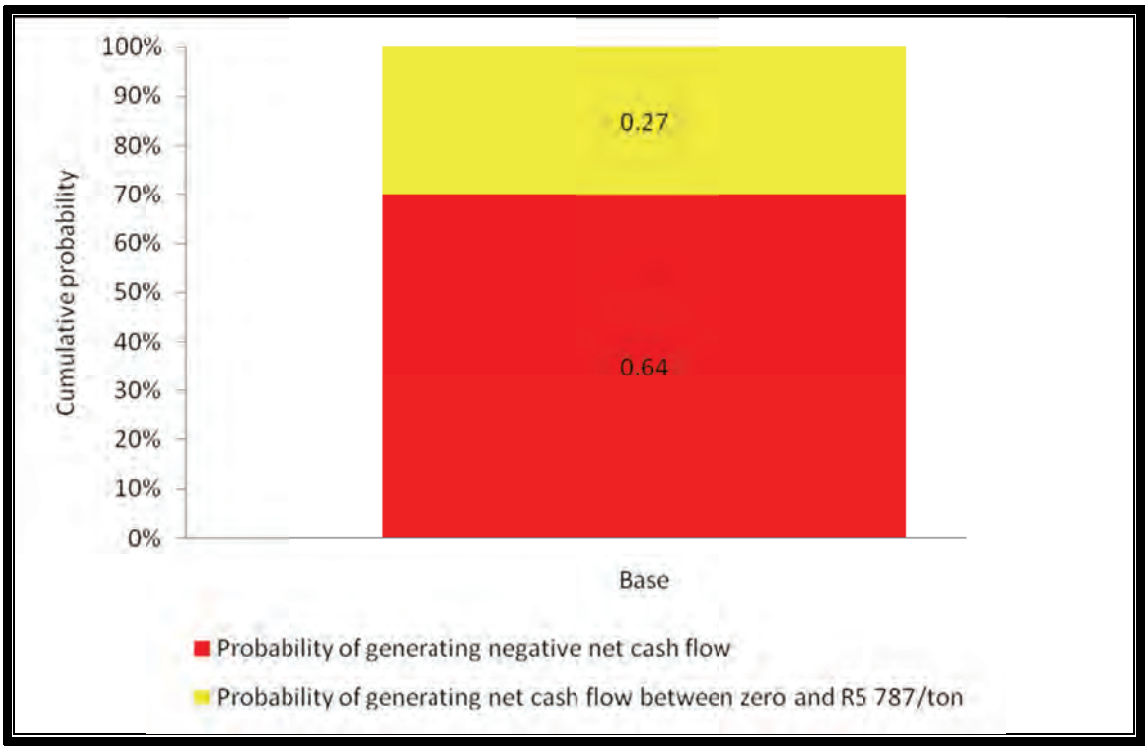

Figure 5. 18: Stoplight chart of net cash flow (in 2011 prices) generated given the current situation at ZIS (Lower limit = 0, upper limit = 5 787).

The red area in Figure 5.18 shows the 64% of farmers who are generating negative net cash flows under the current conditions at ZIS. On the other hand, not a single farmer generates

sufficient positive net cash flow to contribute substantially to the purchase of production inputs in the next season. Under current conditions, the farmers from ZIS thus seem to operate in a poverty trap with very little potential to grow.

The poor performance of the farmers under the base scenario raises some serious questions with regard to the successful contribution of irrigation water to alleviating rural poverty at Zanyokwe. It is true that access to irrigation water is a necessary condition for agricultural activity at Zanyokwe. Without irrigation water, no vegetable production is possible. However, the case of Zanyokwe again proves that providing the farmers with irrigation water alone is not sufficient to alleviate rural poverty. Farmers who generate negative gross margins are actually put in a worse position through having access to irrigation water than they would have been without the water. Given that the idea behind smallholder irrigation schemes is to improve the livelihoods of the rural poor, the fact that some cabbage producers from Zanyokwe are worse off due to producing cabbages is major cause for concern.

5.8.2.2 Scenario 1 – Improving the levels of technical efficiency of vegetable producers from Zanyokwe

The first step in assisting farmers to improve their cash flow positions may be to support them to do the things they are currently doing, but to do them right. In order to model the potential benefit of doing this, the net cash flow of the farmers was modelled with a condition that the farmer must be technically efficient. In other words, the net cash flow for each of the farmers was modelled again, but under the assumption that the farmers produce the maximum amount of output possible from his current input levels.

By forcing the farmers to use their production inputs in a technically efficient manner, the average net cash flow increased by more than 100% to R1 189/ha (from R505/ha). Moreover, by using inputs efficiently, two of the farmers who generated negative gross margins in the base scenario would now generate positive gross margins. By implication, they too would now benefit from having access to irrigation water.

A stoplight chart is drawn to compare the base scenario to the scenario where the farmers use their input in a technically efficient manner (Figure 5.19). The stoplight chart in Figure 5.19 shows that although the farmers are all still not generating sufficient net cash flow to pay for their inputs in the following season, the proportion of farmers who generate negative net cash flow decreases substantially (from 64% to 45%).

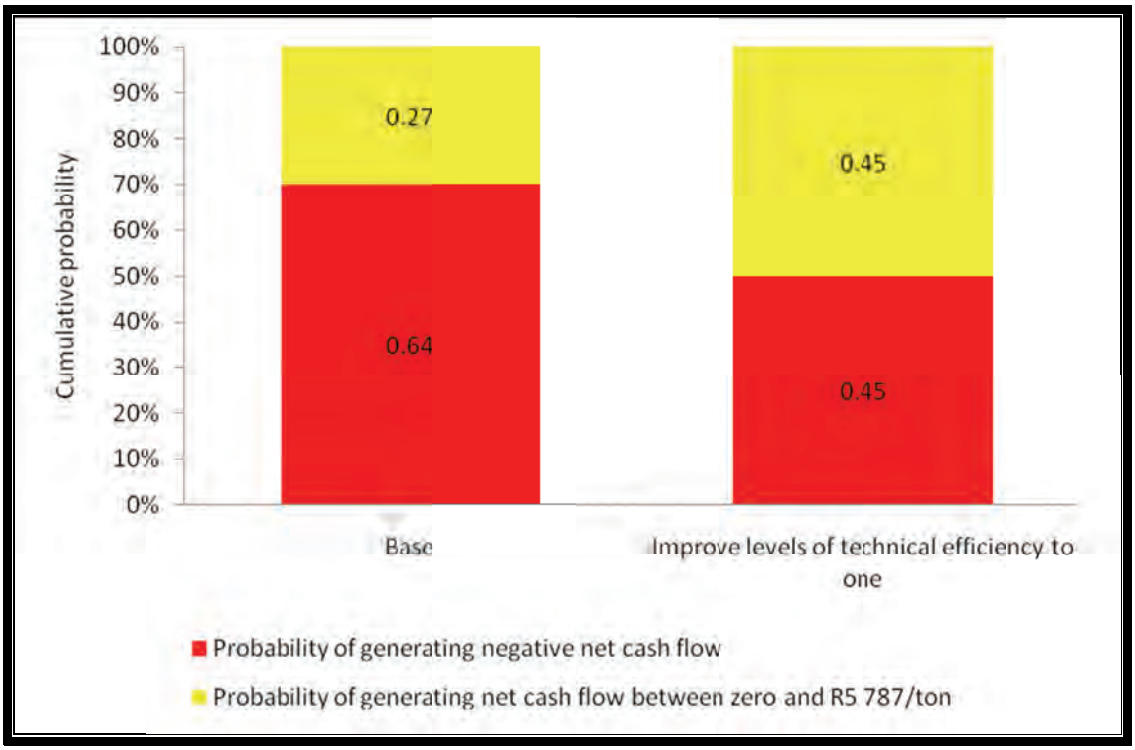

Figure 5. 19: Stoplight chart of net cash flow (in 2011 prices) generated given that the farmers use their inputs in a technically efficient manner, compared to the base scenario (lower limit = 0, upper limit = 5 787).

The improvement in the net cash flow of farmers when they use their inputs in a technically efficient manner suggests that it is worthwhile to invest in training and supporting the farmers to use their inputs in a technically efficient manner.

5.8.2.3 Scenario 2 – Forcing farmers from Zanyokwe to intensify their production activities by using 50% more of production inputs

Except for irrigation water, the farmers from Zanyokwe use input levels which are less than 40% of the recommended levels. Since they operate at increasing returns to scale, a proportional increase in their input levels will lead to a more than proportional increase in the level of output produced. In the second scenario, the farmers from Zanyokwe are forced to use 50% more fertiliser and labour (water is already used at the recommended levels). It is noted that increasing returns to scale would have meant that the output levels should increase by more than 50%. The yield increase, however, is kept at 50% (similar to the increase in inputs) in order to get a conservative estimate of the potential increase in yield.

When assuming that the farmers operate at the same levels of technical efficiency as they currently are, the average net cash flow increases from R505/ha to R1 551/ha. If the farmers could also be supported to use their inputs in a technically efficient manner, the average net

cash flow increases even further to R3 333/ha (a growth of 560%). The stoplight chart presented in Figure 5.20 below shows the distribution of farmers who generate negative cash flow, and those who generate sufficient cash flow to contribute substantially to the capital required to purchase inputs in the next season.

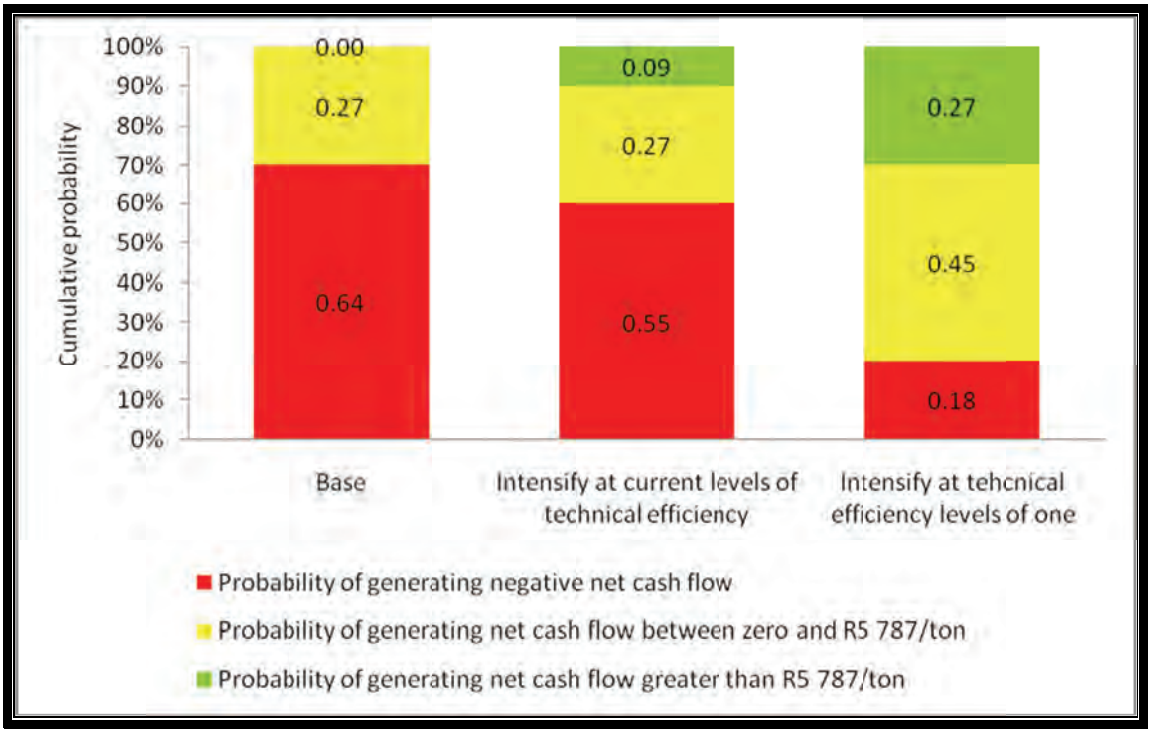

Figure 5. 20: Stoplight chart for net cash flow (in 2011 prices) generated given that the farmers are forced to use 50% more production inputs, compared to the base scenario (lower limit = 0, upper limit = 5 787).

Figure 5.20 shows that the proportion of farmers who generate negative net cash flow decreases from 64% to 55% (Intensify at current levels of technical efficiency) if it is assumed that they operate at current levels of technical efficiency. Similarly, nine percent of the farmers under the new circumstances already make sufficient net cash flow to be able to pay for at least 50% of the inputs required to apply the recommended levels of inputs. If the farmers could be supported to use their inputs in a technically efficient manner, the proportion of farmers generating negative net cash flow decreases even further to only 18% (Intensify at technical efficiency levels of one). Similarly, the proportion of farmers who generate sufficient cash to contribute substantially to the payment of the recommended levels of inputs in the following year increases to 27%. From the increase in the average net cash flow, and the improvement in the distribution of farmers who fall into the higher category of net cash flow (Figure 5.20), it is evident that intensification has a major role to play in the improvement of the livelihoods of farmers from Zanyokwe. Especially when the farmers can also be supported to use their inputs efficiently, the improvement in net cash flow may be substantial.

Given that intensification puts more pressure on the cash flow position of the farmers, the next scenario aims to assess the potential benefit if the farmers could also gain access to formal credit to allow them to intensify their production activities.

5.8.2.4 Scenario 3 – Giving farmers from Zanyokwe access to credit and allowing them to intensify their production activities by using 50% more of production inputs

Similar to the second scenario, the farmers from Zanyokwe are forced to use 50% more fertiliser and labour (water is already used at the recommended levels), but now they also get access to a credit facility of R5 000 from a lending institution (i.e. Landbank) to allow them to pay for the inputs. As expected, there is some improvement in the net cash flow of the farmers if they get access to the credit facility. Under current technical efficiency levels the net cash flow increases to R1 610/ha, compared to R1 551/ha without credit. The average net cash flow of the farmers, when using their inputs efficiently, also increases marginally from R3 333/ha to R3 392/ha when they have access to credit.

Figure 5.21 is a stoplight chart to compare the net cash flow given the circumstances in Scenario 3 to the base scenario. Assuming that the farmers remain at the same level of technical efficiency (Intensity at current levels of technical efficiency) a 50% increase in the input and production levels will have a major impact on the net cash flow positions of the farmers. The proportion of farmers who generate negative net cash flows decreases from 64% to 45%, while there are now nine percent who generate sufficient net cash flow to already pay for 50% of the recommended input levels for the next season. Recall that without credit the proportion of farmers generating negative cash flow was 55% when they used 50% more inputs.

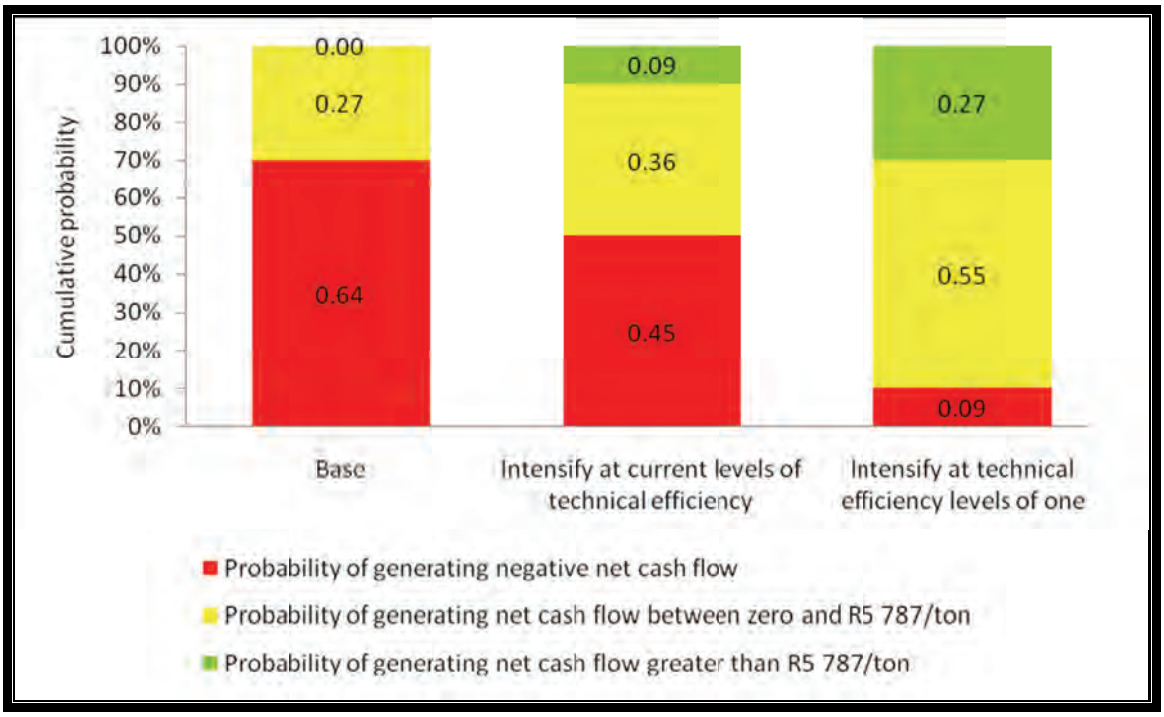

Figure 5. 21: Stoplight chart for net cash flow (in 2011 prices) generated given that the farmers are forced to use 50% more production inputs and have access to R5 000 worth of credit, compared to the base scenario (lower limit = 0, upper limit = 5 787).

When also forcing the respondents to use their inputs in a technically efficient manner, Figure 5.21 (Intensify at technical efficiency levels of one) also shows that the proportion of farmers who generate negative net cash flow decreases to only nine percent, while the proportion of farmers above the upper limit increases to 27%. Again, the decrease in the proportion of farmers generating negative net cash flow improves from the 18% without access to credit. Interestingly, providing the farmers with access to credit seems to have a more drastic impact on the farmers who are on the verge of becoming able to generate a positive net cash flow. The results shown in Figure 5.21 thus show that there is definite potential benefit to allowing the farmers access to credit. Off course, the farmers need also to be incentivised to use the available credit to intensify their production activities. The next scenario aims at modelling the potential impact of paying the farmers a price premium for their vegetables as an incentive to producing more vegetables.

5.8.2.5 Scenario 4 – Giving farmers from Zanyokwe access to credit and allowing them to intensify their production activities by using 50% more of production inputs, and get a 5% premium on price instead of inputs via ZCAC

Currently, Zanyokwe farmers get access to production inputs through ZCAC from the inputs provided by government. Scenario 4 is concerned with modelling the potential impact if farmers were incentivised by means of a price premium for good quality produce, rather than receiving the production inputs from government. The stoplight chart for Scenario 4 is shown in Figure 5.22.

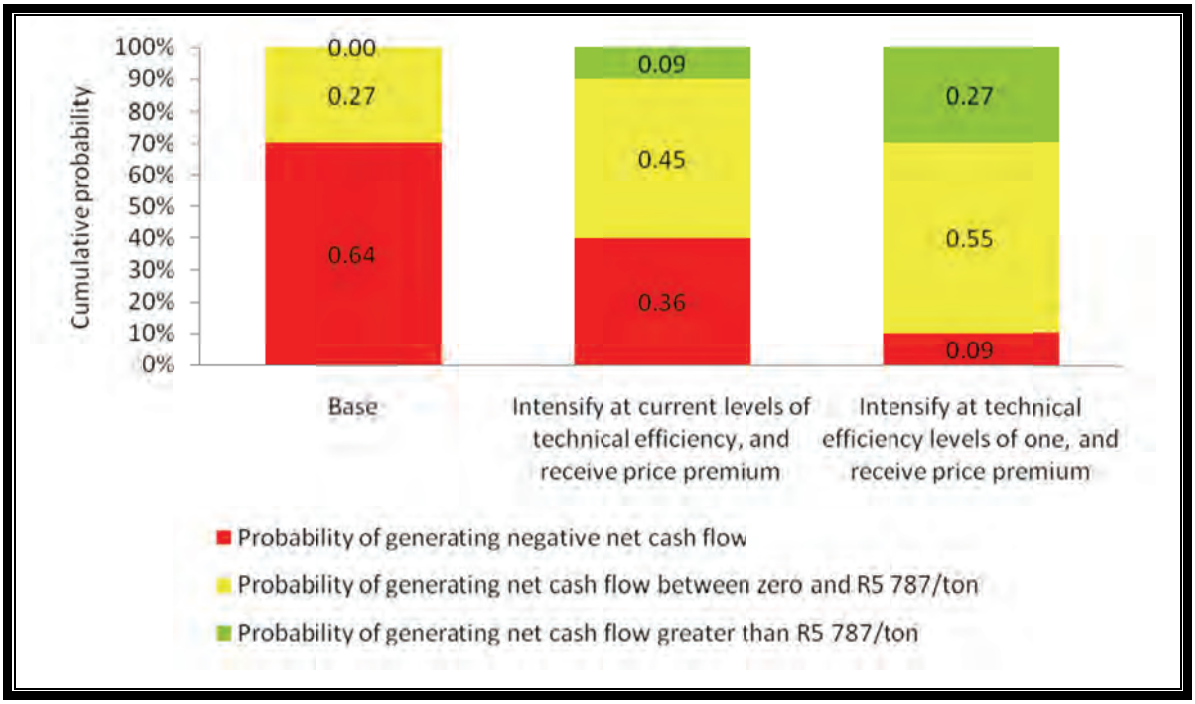

Figure 5. 22: Stoplight chart for net cash flow (in 2011 prices) generated given that the farmers are forced to use 50% more production inputs, have access to R5 000 worth of credit, and receive a price premium of 5% instead of inputs from ZCAC, compared to the base scenario (lower limit = 0, upper limit = 5 787).

The average net cash flow in Scenario 4 increases substantially from the base scenario. At current levels of technical efficiency, the average net cash flow increases to R2 120/ha (growth of about 320%). If the farmers also used their inputs efficiently, the average net cash flow increases to R4 200/ha, which represents growth in net cash flow of 735%. The stoplight chart in Figure 5.22 shows that, at current levels of technical efficiency, the number of farmers generating negative net cash flow decreases to 36% (Intensify at current levels of technical efficiency and receive a price premium) while the number of farmers who generate net cash flow greater than the upper limit is nine percent. While the nine percent is better than the zero percent in the base scenario, it is the same as under Scenario 3 where the farmers receive the

inputs via ZCAC instead of receiving the price premium. Under current levels of technical efficiency, however, the proportion of farmers who generate a negative net cash flow decreases when they receive the premium instead of receiving the inputs via ZCAC. Thus, there seems to be little difference between supplying the farmers with inputs and incentivising them to produce more vegetables by means of price incentives.

5.8.2.6 Scenario 5 – ZCAC hands out the inputs instead of selling it to farmers

In Scenario 5 the idea is to compare the net cash flow of the farmers if ZCAC handed out the inputs as intended by government instead of leveraging the inputs to buy more inputs to allow more farmers to benefit from them. Scenario 5 represents the situation where the farmers receive inputs from ZCAC free of charge, and they do not have access to credit to buy additional inputs, as is the case currently. Interestingly, if ZCAC were to hand out the inputs as intended by government, the average net cash flow would increase from R505/ha to R808/ha, assuming that the farmers remain at the same levels of technical efficiency. Looking at the stoplight chart (Figure 5.23) it is also evident that distribution in the number of farmers who generate negative cash flows is not affected by initiative even if the inputs were handed out to the farmers for free (Receive handouts at current levels of technical efficiency). Such a finding suggests that the input levels supplied by government through ZCAC are at such a low level that the farmers would actually have been able to buy them for cash. The idea behind government supplying inputs to farmers from ZIS seems to be to allow the farmers to produce just enough vegetables to be food secure, nothing more, nothing less. Entrepreneurship is required from the farmers to leverage those inputs if they want to intensify or grow their vegetable production enterprises.

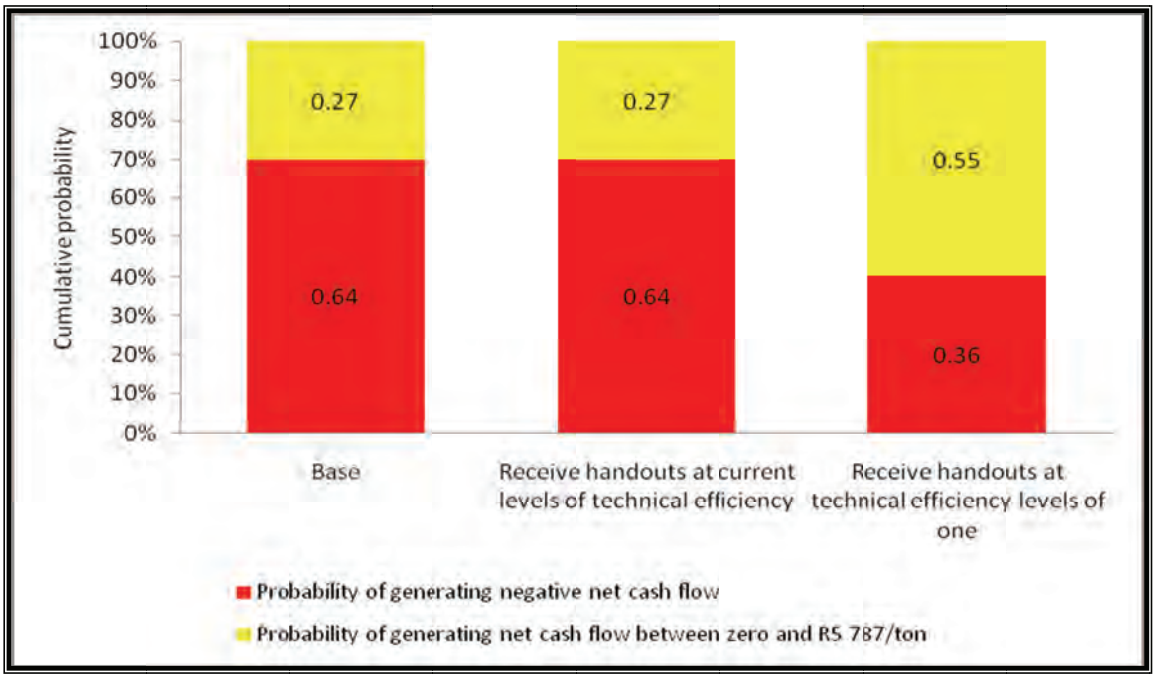

Figure 5. 23: Stoplight chart for net cash flow (in 2011 prices) if the inputs were handed out to the farmers free of charge compared to the base scenario where they have to pay ZCAC for the inputs (lower limit = 0, upper limit = 5 787).

On the other hand, if the farmers were to use their inputs efficiently, they could still improve their current cash flow positions. If the farmers could be supported to use their inputs efficiently, the average net cash flow increase to R1 594/ha (from R505/ha). The stoplight chart in Figure 5.23 also shows that if the farmers were able to use their inputs efficiently, the proportion of farmers who generate negative net cash flows would decrease to 36% (Receive handouts at technical efficiency level of one). Again, the potential advantage of assisting the farmers to use their inputs efficiently is evident.

5.8.3 DISCUSSION AND CONCLUSIONS

The results of the modelling of the net cash flow of the farmers from ZIS under the current situation prove that they are not making sufficient amounts of money to improve their livelihoods through the production of vegetables. As a matter of fact, from the results one may conclude that some farmers are actually worse off financially than they would have been if they had not produced cabbages.

From the results of the different scenarios, it can be concluded that there is some scope for improving the cash flow positions of the farmers. The intensification of production has huge potential to improve the performance of the farmers. In order for them to be able to intensify their production processes, they first have to overcome their cash flow constraints. The scenario where the farmers are allowed access to credit to finance the increased input levels results in

fewer farmers generating negative net cash flows. The farmers from ZIS are thus expected to benefit from having access to credit to finance their production activities. Transferring secure tenure to the farmers (NDP, 2011; CRDP, 2009), or custom made financing schemes (i.e. Mafisa) (CRDP, 2009) thus have great potential to contribute to rural development through its potential contribution to improving the performance of emerging farmers in rural areas.

Arguably the most important conclusion from the modelling of the different scenarios is the potential benefit of supporting the farmers to use their inputs in a technically efficient manner. Regardless of the recommended strategy, the benefits associated with the recommended change are amplified substantially when the respondents also used their production inputs such that they produce the maximum amount of output from the inputs that they use. Support services thus should emphasise the efficient use of inputs when working with the small-scale farmers from ZIS. The results from the modelling of the different scenarios thus show that there potentially are substantial returns possible from investment in training and support of emerging farmers to use their inputs optimally (CRDP, 2009).

The discussion of the potential benefit of teaching and training farmers to use their inputs in a technically efficient manner concludes the section concerned with the modelling of different scenarios aimed at improving the performance of the farmers from ZIS.

CHAPTER 6

EXPLORATORY STUDY OF THABINA MAIZE AND VEGETABLE PRODUCERS

6.1 INTRODUCTION

The aim of Chapter 6 is to apply the developed conceptual framework to the case of maize producers from the Thabina Irrigation Scheme (TIS) in the Limpopo Province of South Africa. Ultimately the idea is to find a way how to sustainably integrate the farmers from TIS into commercial agri-food chains in order to ensure that the farmers are able to improve their livelihoods from having access to irrigation water. Chapter 6 starts with a brief discussion of some background to the case of TIS, followed by a discussion of the activities surrounding the collection of data. The results from the Structure-Conduct-Performance (SCP) analysis follows to describe the way farmers from TIS behave and perform in the physical environment within which they operate. After the SCP analysis, the New Institutional Economics analysis of the case study is presented to gain insight into the reasons why the farmers and other market agents behave the way they do. The NIE analysis is ultimately concerned with the way market actors allocate their resources in the social and institutional environments within which they operate. The application of the integrated SCP and NIE frameworks thus provide comprehensive insight into the current situation at TIS. The application of the integrated SCP and NIE frameworks is followed by an analysis of the value chain within which the farmers operate. More specifically, the value chain is analysed in terms of the flow of the physical product from the farmers to the end-consumer, and the distribution of water used at the respective nodes along the value chain to get the maize from the farmers to the end consumers. After this, the results from a problem tree analysis that aims to identify stumbling blocks that constrain the performance of the farmers from TIS is given. The chapter concludes with a discussion of potential leverage points that may contribute to overcoming the listed stumbling blocks.

6.2 BACKGROUND TO THABINA IRRIGATION SCHEME

Thabina lies at the southern edges of the Levhubu-Letaba water management area. The Thabina Irrigation Scheme (TIS) was started sometime between 1948 and the early 1960s

(Veldwisch, 2006) to promote development and food security in impoverished rural areas of the former Gazankulu and Lebowa homelands. The scheme consists of four wards (Wards A, B, C and D) where the farmers cultivate maize, vegetables and sub-tropical fruit. The farmers live in the surrounding villages (Burgersdorp, Khopo, Lenyenye, Lifara, Mafarane, Mhlaba Kraal and Head Kraal, Sasekane, Shwapane, Zanhoma, etc.) (Perret *et al*., 2003).

In the past, the farmers from TIS were organised as the Gazankulu Cooperative (Rikoto, 2010). As one of the three pilot schemes in the Revitalisation Programme of Smallholder Irrigation Schemes in the Limpopo Province, government assisted with the establishment of the Thabina Water Users' Association in 2000 (Veldwisch, 2006). As a matter of fact, the Thabina WUA was the first smallholder WUA in South Africa endorsed by the Department of Water Affairs and Forestry (Perret *et al*., 2003). The Thabina WUA also performed activities normally associated with a co-operative. Recently, however, the Thabina Farmers' Cooperative was registered (Rikoto, 2010). The management committee of the WUA were also listed as the board of directors of the Thabina Farmers' Cooperative. There are prospects to hold an election in the near future where a new board of directors will be elected (Rikoto, 2010).

The Thabina Dam was originally built as a storage dam for irrigation purposes, but is currently only used for domestic purposes. The TIS receives its water through a canal system from the Thabina River. The canals are open and lined with concrete. The water is led into the main canal by a diversion weir. The length of the main canal is seven kilometres and about five kilometres of it lies outside the scheme. From the main canal the water is distributed through a number of secondary canals (Figure 6.1) to the farms on the respective wards. Water bailiffs control each ward's water supply. Farmers indicated that all wards experience water shortages with ward D being the most exposed as it lies at the end part of the main canal. Electric pumps that were installed in Wards C and D are vandalised on a regular basis to the extent that it takes a long time for them to be repaired, which consequently led to farmers from Wards C and D stop farming. This has become a major source of concern in the scheme (Machethe *et al.*, 2004).

Figure 6. 1 One of the secondary canals that are used to distribute irrigation water from the primary canal to the farms on the respective wards.

Next, the activities are discussed that relate to the collection of the relevant data for analysis.

6.3 DATA COLLECTION

The case study of maize producers from TIS is the third and final case study for the purpose of this research project. Again, both primary and secondary data were required to conduct all of the analyses. Secondary data were obtained from published research reports and other information on TIS documented in the literature. The primary data were obtained from personal interviews with key role-players in the value chains, as well as a questionnaire survey of the farmers from TIS. While the personal interviews with key role players were conducted through a number of visits to TIS between 2009 and 2011, a formal questionnaire survey was conducted to obtain farm-level production and marketing data.

The section starts with a discussion of the activities surrounding the development of the questionnaire, followed by discussions of the procedures used to draw the sample of farmers to be analysed, and the actual survey. Then follows a discussion of the survey that was conducted among the farmers.

6.3.1 DEVELOPMENT OF THE QUESTIONNAIRE

The same conceptual framework that was used to analyse the cases of raisin production and marketing by farmers from Eksteenskuil and vegetable production and marketing by farmers from Zanyokwe Irrigation Scheme (ZIS) was also used to analyse the case of maize production and marketing by farmers from TIS. Since the questionnaire for ZIS was also used to gather

information on the production and marketing of vegetables, the questionnaire to gather data from TIS is merely an adjusted version of that questionnaire. It was adjusted to allow for capturing information that is specific to the case of maize production and marketing from TIS. Adjustments were made based on information obtained from literature on TIS, and discussions with the extension officer from TIS and other members of the management committee of the Thabina Water Users' Association (WUA).

After the adjustments were made, the questionnaire was presented to the extension officer and some of the members of the management committee to get their feedback. After they agreed that the questionnaire was sufficient to capture all of the important information, the questionnaire was deemed ready for the survey.

6.3.2 SAMPLE DESIGN

Previous experiences with questionnaire surveys among emerging farmers, and the fact that emerging farmers are known not to keep sound records, led to the decision to include the whole population of maize producers from TIS to ensure that the maximum number of questionnaires could be completed. In addition to expectations of poor record keeping, the number of farmers who actively cultivate their land at TIS is too small to justify drawing only a sample of farmers to be included in the analyses. While there previously were about 154 farmers, who cultivated 223 ha of land, Rikoto (2010) notes that there are currently only about 30 farmers, who actively cultivate about 45 ha of land.

6.3.3 THE SURVEY

The home languages that are spoken in the region of TIS include Pedi and Tsonga. Given that the majority of farmers from TIS are not proficient in English or Afrikaans, it was important to get interviewers that speak the farmers' languages to ensure that they properly understand the questions. One of the researchers who worked on the project originally comes from Tzaneen and is proficient in the languages spoken by the farmers from the scheme. Her involvement contributed substantially to overcoming the potential linguistic problems associated with the survey. Since the researcher also participated in the survey at Zanyokwe Irrigation Scheme, she already understood the meanings and purpose of all the questions. No training of the interviewers thus was necessary.

Similar to the survey at ZIS, and after discussions with the extension officer from TIS, it was decided to interview the farmers on their farms. They were informed about the survey by the management committee of the Thabina WUA. The idea was to conduct the survey one ward at a time by interviewing all of the farmers who were busy on their farms. Wards C and D were not

cultivated at the time. Only farmers from Wards A and B thus were considered for the purpose of this study.

The actual survey at TIS proved to be a major challenge. The survey was initially scheduled for September 2010, but a severe hail storm during the season saw most of the crop being severely damaged. Consequently, there was no maize or vegetables to be harvested. By the time of the survey, only a few farmers (seven) could be found on their farms. Although they were interviewed, they did not have data on maize and vegetable sales due to the damage caused by the hail storm.

A second attempt at the survey was planned for August 2011. By August 2011, however, no farmers had yet sold any produce. Finally it was concluded that no micro level production and marketing data would be available for analysis. Although the farmers could not provide production and marketing information, they still could provide information on the environment within which they operate, and the major stumbling blocks that constrain their performance. The farmers were therefore still interviewed.

6.3.4 CHARACTERISTICS OF THE MAIZE AND VEGETABLES PRODUCERS FROM THABINA

Only seven farmers were interviewed, due to the absence of the farmers from their farms during the periods of the surveys. The seven farmers represent only 23% of the 30 farmers who are believed to actively farm on their land. The small number of respondents thus means that the discussion of the personal characteristics can by no means be interpreted as representative of the whole TIS. Two (28.6%) of the respondents were female. Interestingly, the proportional distribution of male to female farmers corresponds very well to the distribution documented in the list of members of the co-operative. Rikoto (2011) indicated that, according to the record of members of the Thabina Farmers' Cooperative, 18 (27.7%) of the 65 members are female. Table 6.1 represents summary statistics of the personal characteristics of the maize producers from TIS.

Table 6. 1: Summary statistics of the personal characteristics of the maize and vegetable producers from Thabina Irrigation Scheme.

	Average (n=7)	Minimum	Maximum	Standard deviation
Age (years)	58	42	70	12
Experience (years)	12	4	18	5
Education (years)	5	0	12	4

Table 6.1 shows that the average age of the respondents is 58 years, ranging from a minimum of 42 years to a maximum of 70 years. The average age of the respondents corresponds well with the average age of all of the farmers from TIS as estimated by Rikoto (2011). The average age also relates to that of farmers from other smallholder irrigation schemes and highlights the problem of the aging of the farming communities on such irrigation schemes. Respondents argued that the younger generation is reluctant to enter into farming due to the low profit margins they see being generated by their parents and other farmers in the region. The farmers' views were echoed by statements from some youths in the region who were asked why they don't want to get involved with farming. They said that they do not want to get involved with farming because their parents have been farming all their lives but they remain poor. They argue that their parents spend a lot of money on farming yet they receive very little. One of the young men responded with the question, "What is the point of investing my physical energy on one hectare while I know that the money I can receive still does not meet my family's needs?" The young man stated further that he would rather do piece jobs in town than farm. Other youths even said that they would rather stay at home and do nothing than farm. Evidently, the younger generation has very little aspiration to become commercial farmers. The absence of the next generation to take over the farm from the parent also may serve as a disincentive for the current farmers to invest heavily in their farms.

The average number of years of farming experience of the respondents was 12 years. While the minimum number of years of experience is only four years, the relatively high average and a maximum of 18 years suggest that at least some of the farmers do have sufficient farming experience to be reasonably expected to be able to produce a good crop. On the other hand, the low average number of years of formal education (five years) suggests that on average, the farmers from TIS are not that well educated. While the minimum number of years of formal education was zero years (no formal education at all), the maximum number of years indicated by one of the respondents was 12 years. Only one of the respondents had thus completed Grade 12. The low levels of education of the farmers from TIS are expected to negatively influence their ability to negotiate for better terms of trade with their transacting partners, leaving them very exposed to potential opportunistic behaviour by their transacting partners.

6.3.5 DISCUSSION AND CONCLUSIONS

The unavailability of micro-level production and marketing information over the course of two years implies that the farmers did not generate income from the production of maize and vegetables during those two years. The conclusion is thus that the production of maize and vegetables made no positive contribution to the livelihoods of the farmers from TIS for the two years.

From the discussion of the socio-economic characteristics of the farmers, one may conclude that the vast majority of farmers are male. The farmers have relatively low levels of human capital in terms of formal education, but there are some farmers with relatively high levels of farming experience that allow them to be considered to be experienced maize and vegetable producers. The low levels of formal education may expose the farmers to opportunistic behaviour by their transacting partners.

The fact that the younger generation prove not to have any aspirations to take over the farm business from their parents in future also may disincentivise the current farmers to invest in their farms. Once the farmers get too old to farm, the land will go back to the tribal authority to be reallocated to someone else. The particular family thus will not benefit anymore from the investments that were made in the farms.

In the next section, the results of the application of the Structure-Conduct-Performance (SCP) framework to the case of TIS are presented and discussed.

6.4 STRUCTURE-CONDUCT-PERFORMANCE ANALYSIS OF MAIZE AND VEGETABLE PRODUCTION BY FARMERS FROM THABINA

The aim of the Structure-Conduct-Performance (SCP) analysis of the case of maize and vegetable production and marketing by farmers from Thabina Irrigation Scheme (TIS) is to get a comprehensive understanding of the way the farmers behave and perform in the physical environment within which they operate.

6.4.1 STRUCTURE

More specifically, the structure-component in the SCP analysis is concerned with the physical environment within which the market actors operate. For the purpose of discussion, the structure-component is divided into two components. The first is concerned with the farm structure, while the second is concerned with market structure.

6.4.1.1 Farm structure

For the purpose of the analysis of the farm structure, the respective aspects that are considered include the characteristics of the region, distribution of land, land ownership and tenure, and the condition of the water infrastructure on the scheme.

Region

Thabina Irrigation Scheme is located along the Thabina River at an altitude of about 560 m above sea level. The scheme is located 24 km south-east of Tzaneen, in the tranquil rural area

at the foot of the Rita Mountain. Annual rainfall averages around 790 mm with drastic inter-annual variations, recurrent and severe droughts, and long dry seasons. Ninety percent of the rainfall occurs between October and February (Orne-Gliemann, 2006).

Distribution of land

Previously there were 149 farmers at the scheme, cultivating 234 hectares, but now there are only about 30 active farmers with less than 100 ha of land being cultivated. Initially each farmer was allocated one hectare but reallocation occurred afterwards and average land size per person is now at 1.5 hectares. The small scale of operations at Thabina suggest that the farmers from TIS too are unable to benefit from economies of scale as was found at Eksteenskuil, Zanyokwe, and in the literature on emerging farmers. The farmers from Thabina thus also face one of the major constraints that often contribute to the exclusion of emerging farmers from participating in commercial agri-food chains.

Land ownership and tenure

The land at TIS is under the control of Chief Muhlaba. The farmers have Permission to Occupy (PTO) to the land which limits prospects for selling or leasing the land to another person. Four of the respondents indicated that they lease their land from other farmers who have the PTO for the land, while the other three farmers have the PTOs for their land. Interestingly, none of the farmers who lease their land entered into any form of written contractual agreement with the person from whom the land is leased. However, they still perceive the verbal lease agreement to give them sufficient security to cultivate the land without any concerns that the land will be taken back. Respondents were also asked what type of tenure system they would prefer. All of them indicated that they would have preferred to have the title deeds for the land, but it was informally mentioned that the land belongs to the chief and they don't expect the land to be transferred to individual farmers at all. Despite the perceptions of some of the farmers, one has to conclude that the farmers from TIS do not have secure land tenure. Insecurity in tenure at TIS suggests that the farmers will not have access to formal credit and hence they are also expected to face severe cash flow constraints. The farmers from TIS thus will also benefit substantially if government would comply with recommendations of NDP (2011) and the strategic plan of CRDP (2009) to enhance the transfer of secure tenure to farmers in rural areas.

Geographic cropping structure

In the Limpopo province of South Africa, intercropping maize (*Zea mays*) with cowpeas (*Vigna unguiculata*) and groundnuts (*Arachis hypogeae*) is a common practice among smallholder farmers. Farmers in the scheme also grow maize and vegetables. Maize is mostly grown in summer, although some farmers try winter maize. Summer maize is mainly grown for own family consumption, while possible surplus is sold.

Water infrastructure

The infrastructure for water supply at TIS includes the initial gravity-fed system (weir, dams and a main canal) now combined with four pumps (the first and second are diesel pumps while the third and fourth are electric pumps which have been installed to increase water supply to the main canal (Yokwe ,2005). Unfortunately, the electric pumps have been stolen which makes water distribution for the Thabina farmers a challenge. The farmers from Wards A and B mainly use furrow irrigation systems to irrigate their plots (Figure 6.2).

Figure 6. 2: Farmer from TIS showing the furrow irrigation system that is used to irrigate his crops.

In addition to the poor state of the water infrastructure, the farmers also complained about the quality of the irrigation water. The main canal is used by the communities in the villages to do their washing (Figure 6.3). The washing typically is done in the part of the canal before it enters the irrigation scheme itself, but also in the part of the canal that is on the scheme. The washing is thus done upstream from all agricultural activities at the TIS. The farmers argue that the quality of the water is negatively affected by such practices.

Figure 6. 3: Woman from a surrounding village busy doing her washing in the main canal that supplies irrigation water to TIS.

6.4.1.2 Market structure

In terms of the market structure in the SCP analysis, the aspects under consideration include the different market types that are used by the farmers, the different actors that are involved in moving the produce from the farm to the end consumer, the location of markets, infrastructure at the markets, and the condition of the road network that connects the farmers to the market.

Market types

Thabina farmers use very few market types to market their crops. Both maize and vegetables are sold to hawkers and directly to consumers in the village. There are infrastructural and marketing challenges that negatively affect the ability of the farmers to access alternative market outlets for their produce. For Thabina, like many remote rural areas, food-marketing costs and transaction costs are extremely high. Consequently, farmers sell their produce to informal markets.

Market traders

There are a few market actors that are involved in moving the physical product along the value chain. This section gives an indication of who are the role players who contribute to moving the crops from Thabina producers to the final consumer.

- Input suppliers

Thabina producers typically buy their inputs from the same input suppliers as commercial farmers. Those include Agrotech, Omnia, Stark Ayres, Kynoch, and SASOL, and all these inputs are bought at NTK.

- Farmers

The second type of market actor includes the farmers at Thabina, who produce surplus amounts of maize and vegetables that can be sold to other actors in the value chain.

- Hawkers

Hawkers may be considered to be the main buyers of vegetables produced at Thabina. The hawkers visit farmers on their farm, buy the crop on farm and pay there and then for the crop, making the hawker an attractive channel through which Thabina producers can sell their crops. A large number of hawkers procure their fresh produce from producers at Thabina.

- Transporters

As mentioned above, selling crops through hawkers prove to be an attractive market outlet for Thabina maize and vegetable producers. The producers do not incur transport costs when selling their produce to the hawkers and members of the community since both groups of buyers collect the produce from the farms.

- Consumer

A lot of the crops produced at Thabina are also directly sold to community members. Some of the farmers argue that community members may even be their major clients. Similar to the hawkers, community members also buy the crops from the farms. The farmers thus have no marketing cost to sell their maize and vegetables to the members of the community.

Marketing channel

From the above discussion of the actors involved with moving the physical product from input suppliers to the final consumer, only two marketing channels can be identified.

Farmer — Consumer
Farmer — Hawker — Consumer

The first marketing channel shows that the farmers from TIS sell their crop to community members who are considered to be the final consumer of the product. The second marketing channel represents the farmers who sell their crop through hawkers who sell it to the end consumer.

Location of the markets

Farmers buy their inputs from input suppliers in Tzaneen, which is about 24 km away from the irrigation scheme. They buy all of the inputs such as fertiliser, herbicide and pesticides individually at NTK.

By contrast, the market for their produce is at the farm gate. Most of the produce is sold to hawkers and local community members on-farm. The farmers' choice of market outlet is primarily influenced by the fact that the volumes produced are so low that the demand by community members and hawkers is such that it absorbs all of the maize and vegetables that are produced. Since only one of the seven farmers has a vehicle that can be used to go to town to buy inputs or sell crops, the relatively long distance of TIS from Tzaneen creates the expectation that the distance to the market may be a major stumbling block for the farmers. None of the farmers, however, indicated that the distance is a problem for them. All of the farmers normally sell all of their crops to community members from villages that surround the irrigation scheme, or to hawkers who collect the produce from the farms. The long distance to town thus proves not to be a stumbling block for the farmers.

Infrastructure at markets

The general feeling amongst farmers is that the infrastructure at input suppliers is good and not of any concern. None of them had any complaints with regard to the availability of infrastructure that is sufficient and of a good quality.

Road networks

The road network at Thabina is a cause for concern. The road is gravel and when it rains, neither the farmers, nor potential buyers can get the produce from the farm to the end consumer. Due to the nature of fresh produce, it has to be marketed within a certain period after it is ready to be harvested. The inability to get the product to the market in time has a major negative impact on the performance of the Thabina maize and vegetable producers. It also increases the transaction costs of their buyers since they are uncertain whether or not the farmers will be able to supply the produce. The poor condition of the road network thus is a major stumbling block that negatively affects the performance of the farmers from TIS. The case of TIS thus echoes the challenge faced by emerging farmers with regard to the poor condition of road networks that was identified in the literature, and at Eksteenskuil and ZIS in this study. The fact that the poor condition of road infrastructure is a common feature in rural areas where emerging farmers already face an uphill battle to participate in commercial agri-food chains, government has to meet its commitment to improve road infrastructure (CRDP, 2009) without any further delay. Failing to do so will mean that the emerging farmers may not be able to significantly contribute to rural development through agricultural activities which will negatively impact the likelihood of achieving the vision for 2030 that rural communities should have greater

opportunities to participate fully in the economic, social and political life of the country (NDP, 2011).

Next the focus shifts to the behaviour of the farmers in their physical environment. The behaviour is analysed within the Conduct-component of the SCP framework.

6.4.2 CONDUCT

Conduct is concerned with the way economic agents behave within their physical environment. For the purpose of the discussion of the conduct of the agents a distinction is made between farm conduct and market conduct.

6.4.2.1 Farm conduct

Farm conduct is concerned with the behaviour of the farmers from TIS in the value chain within which they operate. More specifically, farm conduct include aspects such as cropping practices of the farmers, farming techniques that are used, the sources and availability of credit to the farmers, and the types and availability of labour.

Cropping practices

The farmers from TIS have complete autonomy with regard to the types of crops they produce. Currently there are a number of different crops produced at Thabina Irrigation Scheme. The crops mainly include maize, vegetables such as cabbages, butternuts, beetroot, carrots, onions and spinach, while some groundnuts are also produced. The farmers from Thabina are very influenced by the members from the community in terms of the crops they produce. Such a finding was also echoed by a discussion with De Beer (2011) who mentioned that the fact that the farmers from TIS want to produce merely those crops that are widely consumed by members from the community. The concern raised by De Beer (2011) relates to the fact that not all of those crops are really suitable for the specific region.

Farming techniques

The farmers from TIS mostly use traditional farming techniques in combination with some new technology in recent times. The farmers from Wards A and B use furrow irrigation systems to irrigate their fields. As part of the revitalisation process of the scheme, however, three centre pivots have been erected in Wards C and D during 2011. The centre pivots, however, were not yet operational by the end of 2011. In addition to the centre pivots, there are also prospects of drip irrigation systems to be installed on some of the farms, mainly in Ward C. The farms that are to be upgraded with drip irrigation systems have not yet been identified, however.

None of the farmers own their own tractors and implements, while the Thabina Farmers' Cooperative also does not own any tractors or implements. Farmers who want to use mechanised labour to prepare land have to find a contractor to perform the required activities. Respondents argue that the fees for contractors to prepare land are very high at R1 600 per hectare. The majority of activities consequently are performed manually. The respondents, however, hope for tractors and implements to be sponsored by the Department of Rural Development and Land Affairs now that the Thabina Farmers' Cooperative has been registered.

Credit

Thabina farmers, like most other emerging farmers reported in the literature and the farmers from Eksteenskuil and ZIS in this study, do not have easy access to credit. The main reason for their lack of access to credit is the lack of collateral that is required by credit providers. The ownership of the land at TIS lies with the traditional authority (Chief Muhlaba) with the farmers only having PTOs for the land. PTOs cannot be used as collateral to obtain credit from commercial credit providers. The farmers from TIS, moreover, can be considered to be resource-poor farmers. They do not have other assets that can serve as collateral for commercial credit. The farmers also do not keep sound financial records which may convince commercial credit providers of their prospects to generate sufficient revenue from maize and vegetable production to be able to service their loans. The lack of access to credit has some far-reaching effects on the cash flow positions of the farmers from TIS. If government was to transfer secure tenure to the farmers (NDP, 2011; CRDP, 2009) the farmers from TIS may possibly be able to access credit. Financing schemes such as Mafisa (CRDP, 2009) may also allow the farmers to gain access to credit to supplement their cash flow to be able to buy the necessary production inputs to produce good crops.

Labour

Both manual and mechanised labour is used by producers from TIS. The lack of tractors and implements on the scheme and the high fees for contractors lead to most of the farming activities being done through manual labour. It is noted that, while the majority of farmers are male, a lot of the farming activities are actually performed by female members from the household and the community.

6.4.2.2 Market conduct

Market conduct is concerned with the sources and availability of market information, the volatility in the prices of the products, the way prices are formed, the levels of investment in new technology, technical training and support services, the degree of competition in the market and the marketing strategies that are used by the farmers to maximise the income from the produce.

Market information

Initially the management committee of the WUA also had the responsibility to source strategic market information for the farmers. Since the establishment of the Thabina Farmers' Cooperative, the management of the co-operative has the responsibility to gather information and distribute it to the farmers. Market information, however, is not that readily available at TIS. The lack of market information is widely documented in the literature as a major stumbling block for emerging farmers, and the farmers from ZIS also indicated that the unavailability of market information constrain their performance. The fact that the farmers from TIS do not have any relationship with major buyers of fresh produce in the region means that all the pressure for sourcing market information is on the farmers themselves. The recommendation of NDP (2011) to distribute market information to farmers thus will certainly benefit the farmers from TIS.

Pricing

The prices received for maize and vegetables that are produced at TIS are very unstable. The actual prices for the crops depend very much on the levels of supply of the specific products in the region, and the quality of the produce that is for sale.

Formation of price

The farmers from TIS are very much price takers. Both types of buyers that buy crops from the producers from TIS (hawkers and community members) visit the farms and buy the maize and vegetables at the farms. The buyers offer prices for the produce based on the quality of the products and information that they have with regard to supply, demand and prices offered by other buyers. Normally, prices at fresh produce markets serve as reference prices, but ultimately the buyers decide on the prices to be paid for the produce.

The vast majority of respondents indicated that they are not at all able to influence the price for the produce through negotiation with the buyers. On a Likert scale from one to five (a score of one indicates not at all, while a score of five indicates totally able), five of the seven respondents scored a value of one when asked the degree to which they believe that they can influence the price they receive for their produce. The other two respondents scored four which suggests that they do feel that they have the ability to influence the price they receive for their crops.

Investment in new technology

The introduction of centre pivot and drip irrigation systems to the scheme represents substantial investment in new technology on the irrigation scheme. The centre pivots were sponsored by Department of Agriculture while the promised drip irrigation systems will also be sponsored by the Department of Agriculture. Individual farmers, however, are unable to really invest in new technology themselves mainly due to the limited available capital and the lack of access to credit. The scale on which they farm, moreover, does not necessarily justify an investment in new technology by individual farmers. The low levels of human capital of the farmers from TIS

make it more difficult for the farmers to adopt sophisticated new technology. Similar to the case at ZIS, the farmers from TIS thus will most likely not benefit from investments in research and development that focus its attention on creating or adapting sophisticated new technology (NDP, 2011).

Investment in technical training and service

Some of the other role-players along the chain did provide technical training to the Thabina vegetable producers in the past, but only on an ad hoc basis. This is usually conducted as farmers' days where farmers are given advice on what, when and how to produce specific crops for the area. There is major scope to increase the number of training sessions to the farmers from TIS in order to improve their performance. The emphasis government is placing on improving the skills of emerging farmers (NDP, 2011) likely will benefit the farmers from TIS. Again, instead of taking the responsibility of training on itself, government may be well advised to explore ways to incentivise private sector firms, especially major role-players in commercial agri-food chains (i.e. agro-processors), to actively contribute to improving the skills of emerging farmers in rural areas. Such firms typically do exhibit the relevant knowledge, and they know exactly what quality specifications need to be met in order to participate in the specific chain. Thus, it may be easier for such firms to present effective training sessions to emerging farmers.

Competition in the market

The TIS is close to a number of surrounding rural villages. The level of demand for fresh produce is thus high. Recall that the main buyers of fresh produce from the farmers from TIS include members of the community and hawkers. According to the respondents, there are a number of hawkers that procure fresh produce from the scheme, while a large number of community members also buy from the farmers. As a matter of fact, the demand for fresh produce from the farmers from TIS still outweighs the supply of fresh produce. The competition amongst the buyers is considered to be high. High competition amongst the buyers may have upward pressure on the prices they offer to the farmers from TIS.

Contract

At this stage there are no farmers who produce vegetables under contract. The lack of contracts exposes producers to uncertainty with regard to the volume they will be able to sell as well as the price they are going to receive for their produce. The high level of uncertainty contributes to an increase in the transaction cost faced by the farmers.

There are, however, prospects for contractual relationships to be established with a vegetable processing plant in the region. Government has approached the processing company to act as mentor to the farmers from TIS for the cultivation of the land under the newly established centre pivot irrigation systems. De Beer (2011) indicated that the idea is for the processing company to contract Thabina Farmers' Cooperative as a supplier of fresh produce.

Marketing strategies

The respondents show little innovation in terms of the marketing strategies they follow in order to maximise the income they can earn from their fresh produce. As a matter of fact, no type of marketing strategy was mentioned in any of the discussions with role-players on the scheme, nor in interviews with farmers during the survey. The farmers did not even indicate that they would be willing to drop their prices in order to ensure that they get to sell their crops. While such a finding may suggest that the farmers are not innovative in terms of marketing their crops, it may also be a result of the fact that farmers did not harvest surplus yields during the past two years due to adverse weather conditions. Periods of higher supply may force the farmers to follow one or another marketing strategy to make sure that they get their produce sold, and at reasonable prices.

The discussion of the lack of marketing strategies in the case of vegetable marketing at TIS concludes the analysis of the conduct-component in the SCP framework. In the next section, the level of performance of the farmers from TIS is analysed.

6.4.3 PERFORMANCE

The analysis of the performance of the farmers from TIS is only concerned with a description of the volumes produced and income generated by the farmers through the production and marketing of fresh produce. As mentioned earlier, however, the farmers from TIS were unable to harvest any surplus crops during the past two years due to adverse weather conditions. First the crop was completely demolished by a severe hail storm. The next season saw heavy rains completely damaging the crops. The farmers do not take out any form of crop insurance due to limited cash flow. The failure to harvest and market their crops thus means that they do not earn any income from producing maize.

In terms of the analysis of the performance of the maize and vegetable producers from TIS one thus has to conclude that their performance is a major cause for concern. Although the crop failures cannot be attributed to mistakes made by the farmers, the failure to generate income from the crops implies that the farmers did not receive any return on their investments in the production of maize during the past two years. Importantly, the failure to generate income also implies that the productivity of the water that was allocated to the farmers for irrigation purposes is negative. By implication, the vegetable producers from TIS thus are worse off from having had access to irrigation water. Ultimately, the objective to provide the farmers with irrigation water to improve their livelihoods was thus not met during the past two seasons.

6.4.4 CONCLUSIONS

Based on the SCP analysis of the case of maize and vegetable production and marketing at TIS, one has to conclude that the physical environment within which the farmers operate does have an impact on the behaviour and performance of the farmers. The land tenure system where the farmers only have PTO of their land means that the farmers cannot source credit from commercial credit providers to finance production activities, nor can progressive farmers buy or lease additional land from other farmers to expand their farming activities. The lack of cash flow also means that the farmers are not able to take out crop insurance as a way to manage their exposure to extremely high levels of production risk. The road network from the scheme to the market is also in such a poor condition that it substantially increases transport costs to deliver produce to any buyers away from the scheme. Farmers thus prefer to sell their crops to buyers who collect it on the farms.

Discussions with farmers during interviews also led to the conclusion that the farmers from TIS have very little aspiration to find alternative buyers for their produce. All of the respondents indicated that they are happy selling all of their produce to hawkers and members of the community. The lack of aspiration may be caused by the fact that the farmers haven't produced large volumes of crops in more than two years. The increase in effort and transaction cost to find alternative buyers for relatively small volumes of produce may be higher than the increase in revenue they can potentially earn from selling their produce to another buyer.

Ultimately, the poor performance by the farmers from TIS against the backdrop of substantial investment in the scheme through the Revitalisation Programme of Smallholder Irrigation Schemes in the Limpopo Province, is a major cause for concern. Currently one has to conclude that there is no return on the substantial investments. Evidently it is crucial to find ways to improve the performance of the farmers from TIS to improve the return on the investments that have been made in the scheme. In the next section, the New Institutional Economics framework is applied to the case of TIS to gain more insight into the social and institutional environment within which the farmers operate, and the ways transactions are organised.

6.5 NEW INSTITUTIONAL ECONOMICS ANALYSIS OF THE PRODUCTION AND MARKETING OF MAIZE AND VEGETABLES BY FARMERS FROM THABINA

The New Institutional Economics analysis of the case of maize and vegetable production and marketing by the farmers from the TIS aims to gain comprehensive insight into the reasons that underlie the behaviour of the farmers. The New Institutional Economics framework consists of four levels of analysis; social embeddedness (Level 1), institutional environment (Level 2), governance structures (Level 3), and resource allocation and employment (Level 4). In the first

level, the social embeddedness of the farmers from TIS is assessed to better understand the influence of culture and cultural activities on the behaviour of the farmers. Social embeddedness is also concerned with the levels of social capital of the farmers. The analysis of the social embeddedness of the farmers from TIS thus provides insight into the social environment within which the farmers operate.

The second level is concerned with the institutional environment. The institutional environment contains all the formal rules and regulations that determine the way economic agents have to operate, but also the informal rules that may influence the behaviour of the actors in the value chain. Again there are a number of laws, rules and regulations that have to be complied with by any agricultural producer and marketer. For the purpose of the analysis of the institutional environment for the case of TIS, however, the analysis is limited to those institutions (both formal and informal) that are specific to the case of maize production and marketing at TIS.

The analysis of the way transactions between vegetable producers from TIS and their buyers are organised is covered in the analysis of the third level in the New Institutional Economics framework. More specifically the analysis of the governance structures aims to match the characteristics of the transactions with the optimal type of governance structure to ensure that there is a good match between the degree of coordination control and the cost of potential coordination errors that may occur. The optimal degree of vertical coordination for the case of maize producers from TIS is the outcome of such an analysis.

The last level in the New Institutional Economics framework is concerned with the allocation of resources. Efficiency analyses to determine the degree of efficiency with which the farmers use their production inputs form a major part of the analyses in the fourth level of the framework. Unfortunately, the lack of farm-level production and marketing data makes efficiency analyses impossible for the case of maize production and marketing by the farmers from TIS. The results from the analyses of the first three levels are presented and discussed next.

6.5.1 SOCIAL EMBEDDEDNESS (LEVEL 1)

The analysis of the social embeddedness of the farmers from TIS is divided into an analysis of cultural activities that influence the incentives for the farmers to cultivate their land, and an analysis of the social capital levels of the farmers that influence the degree to which they are willing to work together to coordinate their activities to maximise their returns to the farming activities they perform.

6.5.1.1 Cultural norms and traditions that influence behaviour of producers from Thabina Irrigation Scheme

From discussions with role-players at TIS and the survey of the farmers, no cultural activities were identified as influencing the farming activities of the maize and vegetable producers from TIS. A problem that was mentioned, however, relates to the two different ethnic groups of farmers who form part of TIS. The scheme consists of Pedis and Tsongas and both groups of farmers fall under the tribal authority of Chief Muhlaba. Chief Muhlaba is a Tsonga. Recall that the allocation of land is the responsibility of the tribal authority, and that the farmers from TIS were allocated pieces of land of about 1.5 hectares. The farmers have approached the tribal authorities to allocate more land to them to allow them to expand their production activities. However, according to the farmers they have not received any feedback "for years". The farmers indicated that farmers from a nearby irrigation scheme, Joulesburg, were allocated land of about five to eight hectares each. Joulesburg is about 15 km from Thabina and also falls under the authority of Chief Muhlaba. The problem is that the farmers from Joulesburg are predominantly Tsonga, like the chief himself. The farmers now believe that Tsonga farmers are favoured because they belong to the same tribe as the chief. To make matters worse, the extension officer is also a Tsonga. The office of the extension officer is at the offices of the Thabina Farmers' Cooperative, which are located on Ward B. Again, Ward B is cultivated by farmers who are predominantly Tsonga. The extension officer does not have a motor vehicle to drive around the scheme to perform his duties, but rather has to go by foot wherever he needs to go. Consequently, the farmers from Ward B see the extension officer much more frequently than the farmers from Ward A. The farmers from Ward A (predominantly Pedis) now believe that the reason why the extension officer does not visit them frequently is because they are Pedis and he is Tsonga. He would rather visit the farmers who belong to the same tribe as himself. Such perceptions negatively affect the coherence in the group of farmers from TIS.

The causes for the destabilisation of the coherence in the group, however, do not only stem from the fact that the Pedis believe that the Tsonga farmers are favoured. Ward A, where the farmers are predominantly Pedis, lies upstream along the river from the other three wards and is closer to the tarred road. Consequently, the farmers from Ward A have better access to irrigation water. The farmers from Ward A do not keep to the irrigation schedule and irrigate more often than they are supposed to. The failure to comply with the irrigation schedule means that there often is insufficient water available for the farmers from Wards B, C and D to irrigate their crops. Even recently, when Wards C and D were not cultivated anymore, the farmers from Ward B did not have enough irrigation water to irrigate their crops properly. The Tsonga farmers from Ward B consequently believe that they are sabotaged by the Pedi farmers from Ward A. The close proximity of Ward A to the tarred roads also makes Ward A favoured by the hawkers who are the main buyer of vegetables from the farmers from TIS. The Tsonga farmers from Ward B, however, believe that the buyers favour the farmers from Ward A because they are

Pedi. All of these issues contribute to destabilising the social coherence in the group of farmers from Thabina Irrigation Scheme.

The conflict between the two groups of farmers also has some other repercussions. Few of the farmers from TIS are proficient in English or Afrikaans. Whenever training sessions are organised, interpreters thus also have to be organised that can translate what has been said into Tsonga and Pedi. Both groups of farmers do understand each other's language. The farmers, however, do not want to be trained in the language of the other tribe. It was mentioned that trainers felt that it is too much of an effort and it takes too much time to translate the training session into the two languages. Consequently, organisations prove to be more and more reluctant to provide training session to the farmers from TIS.

Another issue that came to the fore relates to the development of the land in Wards C and D where centre pivot irrigation systems were installed. The idea is to farm the land under the centre pivots as a collective entity (Thabina Farmers' Cooperative). All members of the co-operative thus will benefit from the operations under the centre pivots. The problem, however, is that some of the farmers who originally were allocated land at Wards C and D are not happy that the farmers from Wards A and B also are going to benefit from the project. The argument is that, while the water infrastructure at Wards C and D was vandalised to such an extent that no farming activities could take place at Wards C and D, the farmers at Wards A and B were able to produce their vegetables and sell it for their own benefit. No farmers from Wards C and D benefited at all from the agricultural activities that occurred at Wards A and B. Consequently, the farmers from Wards C and D feel that it is not fair that the farmers from Wards A and B will benefit even while they are still farming on their original plots at Wards A and B. Rikoto (2011), however, argues that he does not foresee that there will be a problem. Farmers from Wards C and D who want to farm on individual plots may approach the office of the extension officer to apply for a piece of land in Wards A and B. The extension officer then can help the farmer to identify a vacant piece of land, and write a letter to chief Muhlaba recommending the allocation of the specific piece of land to the farmer under consideration. Rikoto (2011) argues that the allocation of plots to farmers in such a manner may ease the tension felt by the farmers from Wards C and D who feel that they have to unfairly share their benefits to the farmers from the other two wards.

Alarmingly, another concern was raised by the female farmers who farm in Ward B. When asked why only a few farmers are female, they responded that it is unsafe for women to walk to their farms alone and to be alone on their farms during the day. The farmers do not live on their farms, but rather in villages in the surrounding areas. The farmers thus have to walk through bushy terrain to get to their farms, and the farms are also surrounded by thick bushes. The women said that they are afraid of being attacked by criminals if they have to walk to their farms alone. Female farmers thus have to find other farmers to walk with them to the farms for security

purposes. Rikoto (2011) also confirmed that those individuals who vandalise the irrigation equipment on Wards C and D stay in the bushes and may cause danger to the women who have to go to their farms. Wards C and D are farther away from villages hence they are more remote. That is the reason why the danger is more felt closer to Wards C and D, compared to Ward A. Ultimately, crime in the region has a major influence on the livelihoods of the farmers from TIS, especially the female farmers.

Thus, although there are no cultural activities that incentivise some farmers not to cultivate their land, one may conclude that the cultural conflicts between the two groups of farmers from TIS do have a major negative impact on the behaviour and performance of the vegetable producers from TIS. Next, the social capital of the farmers is analysed in more detail.

6.5.1.2 Social capital analysis of maize and vegetable producers from Thabina Irrigation Scheme

The analysis of social capital is concerned with the analysis of non-contractual elements such as shared norms, trust, and social networks (Milagrosa, 2007). Following the recommendation of Grootaert and Bastelaer (2002) a distinction is made between cognitive and structural social capital.

Cognitive social capital of producers from TIS

Farmers were asked to rate a number of statements that represent proxies for different dimensions of cognitive social capital on a five-point Likert scale in terms of the level to which they agree with the statements. A score of one means that the respondent strongly disagrees, while a score of five means that the respondent strongly agrees with the statement. The small number of observations unfortunately does not allow for a factor analysis on the respective components that were included as proxies for the level of cognitive social capital of the farmers from TIS. For the purpose of the analysis, the different proxies were subjectively grouped into different groups based on the assumption that the proxies that are grouped together measure the same underlying concept. The average score for each group of variables was calculated to get insight into the contributions of the different dimensions to the overall level of cognitive social capital of the farmers. Table 6.2 shows the summary statistics of the farmers' ratings for the respective components.

Table 6. 2: Summary statistics of farmers' ratings of proxies for cognitive social capital on a five-point Likert scale (totally disagree = 1, and strongly agree = 5).

	Average (n=7)	Minimum	Maximum	Standard deviation
Networks	4.7	4	5	0.5
Trust	4.4	3.5	4.7	0.4
Satisfaction	3.9	3	5	0.7
Optimism and expectation of equal treatment	3.5	2.5	4.5	0.7
Cognitive social capital index	4.1	3.9	4.6	0.3

Table 6.2 shows that the average score for "Networks" is the highest with a score of 4.7 out of a possible five, ranging from a minimum of four to a maximum of five. The proxies that were grouped under the component "Networks" relate to the degree to which the respondents indicated that they get along with their families, friends, other farmers, and other people in the community. Based on the average score for the degree to which the farmers get along with other people in the community, the results suggest that the farmers get along very well. Interestingly, such a finding contradicts the soft information that was obtained from other personal interviews that highlighted the conflict between the two groups of farmers.

Similarly, the average score for "Trust" is also high (4.4 out of five). The proxies that were grouped under "Trust" include the level to which the respondents trust their families, friends, other farmers in the region, members of the community, the legal system of South Africa, and the police services. Again the high average score suggests that the respondents from the TIS do trust one another, and the other people who move in their circles. The high levels of trust as shown by the respondents' ratings of the statements again contradict the soft information on the internal political issues that negatively affect the coherence of the group of farmers from TIS.

The average score for the level to which the respondents are happy and satisfied with their lives is also relatively high (3.9). The high score despite the major challenges faced by the farmers, and the fact that they failed to harvest any maize, or any crop for that matter, during the past two seasons is interesting. The fact that crop failures in the past two consecutive years did not break the morale of the farmers may possibly be an indication of the lack of aspiration of the respondents to really commercialise their vegetable production activities.

The last dimension represents the degree to which the respondents believe that their lives will become better in future. Although the average score for this dimension is the lowest of all, it is still relatively high (3.5). On average, the respondents seem to be relatively optimistic about the future. The reason for the optimism may be related to the recent developments on the scheme where three centre pivots were installed, and the rumours that government may provide them with tractors and implements in the near future.

Based on the high average scores for the four different dimensions, it is to be expected that the average score for the cognitive social capital score should be high. The average score for the cognitive social capital is 4.1 out of five which is very high. The results of the analysis of the cognitive social capital of the farmers from TIS thus show that the farmers generally trust and get along well with the other people on the scheme with whom they interact, they are relatively satisfied with their current situation, but still believe that things may improve for them in the near future. Based on these results, the conclusion is thus that the social environment within which the farmers operate actually is very conducive to collective action by the farmers from TIS.

Next, the levels of structural social capital is analysed to get insight into the degree to which the respondents actively participate in group activities in their region.

Structural social capital of producers from TIS

The structural social capital of the respondents is measured in terms of the degree of active membership in formal organisations. Based on discussions with farmers in the region, there are mainly three types of organisations of which the farmers may be members. Those include the church, political parties, and the Thabina Farmers' Cooperative. The farmers were asked to indicate on a Likert scale the degree to which they are actively involved in the respective organisations, where a score of one indicates that the respondent is not a member; a score of two indicates that the farmer is a member but is not that actively involved; while a score of three implies that the farmer is an active member of the particular organisation. Table 6.3 shows the summary statistics of the farmers' responses to the questions regarding their active membership of formal organisations.

Table 6. 3: Summary statistics of farmers' ratings of their membership of formal organisations on a three-point Likert scale (non-member = 1, inactive member = 2, and active member = 3).

	Average (n=7)	Minimum	Maximum	Standard deviation
Thabina Farmers' Cooperative	2.9	2.0	3.0	0.4
Church	2.4	1.0	3.0	1.0
Political party	1.1	1.0	2.0	0.4
Structural social capital score	2.1	1.7	2.7	0.4

The summary statistics in Table 6.3 show that the respondents are actively involved in a number of formal organisations as is evident from the relatively high average structural social capital score of the farmers of 2.1 out of a possible three. The highest average score (2.9 out of a possible three) was obtained for active membership in the Thabina Farmers' Cooperative. All but one of the respondents indicated that they are active members of the co-operative. The other person is a member, but does not actively participate in activities organised by the co-operative. The fact that the farmers are actively involved in the operations of the co-operative is

good news given the potential of collective action in improving the performance of the farmers from TIS. The plan is also to operate the land under the centre pivots as a collective unit. The success of such operations will depend heavily on the degree to which the farmers are able to function collectively. Active membership of the co-operative may be a step in the right direction.

The second highest average score was obtained for active membership of a church or religious organisation. Again, the average score proves to be high, being 2.4 out of a possible three. It is noted that, while active membership of a church may seem not to be relevant to the performance of the farmers, active membership of any organisation contributes to creating a culture of consultative decision making. Farmers who are used to functioning collectively in other organisations may also be more comfortable to function collectively in terms of their farming activities.

Table 6.3 shows that the lowest average score was obtained for active membership of political parties. Interestingly, only one of the respondents indicated that he was a member of a political party, albeit an inactive member. None of the other respondents indicated that they are members of political parties. Although it is recognised that membership of formal organisations does stimulate consultative decision making, politics is known to divide people. The fact that the respondents indicated that they are not involved in politics may be good news for the coherence of the group of farmers. Next, an overall social capital index is calculated for the vegetable producers from TIS, which combines the information of their cognitive and structural social capital into one index.

Overall social capital of the maize and vegetable producers from TIS

The overall social capital index is calculated by adding the structural and cognitive social capital scores together, and dividing the answer by eight to express the index as a percentage. Table 6.4 show the summary statistics of the farmers' overall social capital indices.

Table 6. 4: Summary statistics of the farmers' overall social capital indices (%).

	Average (n=7)	Minimum	Maximum	Standard deviation
Overall social capital index	78.2	69.9	90.2	7.2

Given the high levels of cognitive and structural social capital discussed above it is understandable why the average of the overall social capital indices of the maize producers from TIS is so high. Even the minimum social capital index is just lower than 70%. Overall one thus may conclude that the maize producers from TIS do exhibit high levels of social capital. The farmers claim to trust each other, get along well with each other, and are active members of formal organisations.

6.5.1.3 Conclusions

Based on the analysis of the social embeddedness of the producers from TIS, the conclusion is that the social embeddedness of the farmers is expected to have an influence on the way they behave, and consequently on their performance. The cultural differences between the two tribal groups of farmers that farm on TIS destabilise the coherence of the collective unit. Both groups of farmers believe that the other group is acting opportunistically at their expense. The first group of farmers believe that the others use irrigation water such that there is insufficient water for them to properly irrigate their crops. The other group again believes that the first group of farmers benefit unfairly from buyers who only buy their crops. Both groups believe that the reason behind that particular behaviour is the fact that the other group of farmers belong to a different tribe.

Interestingly, the conclusion from the social capital analysis is that the farmers get along well with one another, they trust each other, and they are actively involved with formal organisations in the region. To a large extent, the conclusions from the social capital analysis contradict the conclusions from the analysis of the cultural norms and traditions that may influence the behaviour of the farmers. It has to be recognised that the analysis of the cultural norms and traditions is also based on soft information obtained from discussions with the farmers. The soft information may potentially be a better indication of the way the respondents really feel, compared to the image they want to project during the questionnaire survey. On the other hand, the analysis of the social capital required the farmers to rate specific issues. The difference in the results thus may also possibly be attributed to the fact that, while there is a general perception that the other group of farmers acts opportunistically, when the farmers are probed on specifics, they may have realised that there actually is not as much distrust as they initially thought. From that perspective again, the social capital analysis may be a more accurate representation of reality. Unfortunately, there is no way to determine which view is correct, but one may conclude that the social environment within which the farmers operate is definitely expected to influence their behaviour.

Next the focus shifts to the institutional environment within which the farmers operate.

6.5.2 INSTITUTIONAL ENVIRONMENT (LEVEL 2)

The analysis of the institutional environment within which the farmers operate is concerned with the formal and informal rules the influence the behaviour of the farmers from Thabina Irrigation Scheme.

6.5.2.1 Formal institutions that influence the behaviour of the farmers from TIS

In addition to the number of generic laws, rules and regulations that have to be met by anybody who wants to produce and market agricultural products, the farmers from Thabina Irrigation Scheme also face some other formal rules that are specifically targeted at them. For the purpose of the discussion of the formal institutions, the focus will be only on those institutions that are specific to the case of maize and vegetable production and marketing at TIS. The first set of rules that influence the behaviour of the farmers from TIS relates to the land tenure systems that are used at TIS. Other formal institutions include the constitution of the Thabina Water Users' Association, and the constitution of the Thabina Farmers' Cooperative.

Land tenure systems present at TIS

As discussed in the analysis of the farm structure, the ownership of the land lies with the traditional authorities while the individual plot holders only have PTOs for the land. The PTO is a usufructary right which allows the farmer to use the land to generate income from it. However, the holder of a PTO cannot sell or lease the land to another person. Nor can land under PTO be used as collateral to obtain formal credit. The holders of PTOs thus are only allowed to use the land for agricultural purposes to generate income. Despite the legal restrictions of the PTO to disallow holders of the PTO to lease the land to another person, a number of farmers do lease land from PTO holders. Thus, some of the farmers from TIS fail to comply strictly with the rules and regulations associated with a PTO as land tenure system.

One way through which the tenure system does influence the behaviour of the farmers is by only allowing the holders of PTOs to become members of the Thabina Water Users' Association and the Thabina Farmers' Cooperative. Interestingly that rule is strictly enforced. Next the way that the constitution of the Thabina Water Users' Association aims to influence the behaviour of the farmers from the TIS is discussed.

Constitution of the Thabina Water Users' Association

The first set of formal rules that aims to influence the behaviour of the farmers from TIS is the constitution of the Thabina Water Users' Association. This specifies the conduct of the farmers with regard to irrigation practices on the TIS, and also the fees that are payable by the water users on the scheme. An irrigation schedule is also kept to ensure that the farmers have equal access to the irrigation water. Based on discussions with some of the farmers, it is evident that the rules are not followed. Some farmers do not keep to the irrigations schedule and irrigate for longer than they are supposed to, or on days that they are not supposed to irrigate. The failure to comply with the schedules means that farmers downstream do not have sufficient irrigation water to properly irrigate their crops. Rikoto (2012) admitted that the WUA is not functioning at all. Farmers do not measure the amount of water they use, nor do they pay for the water they use. Nobody on the scheme even knows the amount of water that is allocated to the farmers.

Keep in mind that the WUA was established already in 2000 and the management was transferred to the WUA soon after. The non-functioning of the WUA is a major cause for concern and may be the primary reason behind the farmers' complaints with regard to the unavailability of sufficient irrigation water to properly irrigate their crops.

Constitution of the Thabina Farmers' Cooperative

The second set of formal rules that aim to influence the behaviour of the farmers from TIS is the constitution of the Thabina Farmers' Cooperative. In addition to specifying the code of conduct of functioning of the co-operative as a business entity, the constitution also specifies the code of conduct of the members in terms of agricultural practices. While the farmers to date have not functioned collectively to a great extent, the degree to which the constitution of the Thabina Farmers' Cooperative does influence the behaviour of the members remains questionable. There are, however, good prospects for more collective action in terms of the cultivation of the land under the three centre pivots that were installed as part of the revitalisation project of the TIS. The rules and regulations specified in the constitution of the Thabina Farmers' Cooperative are thus expected to have much more of an influence in future.

In addition to the formal rules and regulations that aim to influence the behaviour of the farmers from TIS, the farmers also have to comply with some informal institutions. These are discussed next.

6.5.2.2 Informal institutions that influence the behaviour of the farmers from TIS

The main difference between formal and informal institutions is that informal institutions are not legally enforceable. In the case of vegetable production and marketing at TIS, there are some informal institutions that influence the behaviour of the farmers. The informal institutions relate very much to the role of the traditional authorities in the operations on the scheme. Holders of PTOs who do not cultivate their land for a certain period can be approached by the traditional authorities to determine the reasons for not cultivating the land, and ultimately the traditional authority may take back the PTO and reallocate the land to another person.

The traditional authority also has a major role to play in conflict resolution. If there is any form of conflict between two farmers which they cannot resolve among themselves, the parties first approach the management committee who will try to resolve the matter. If the management committee fails to resolve it, the issue is raised with the traditional authority, which ultimately makes the final ruling. Both parties then have to accept the ruling made by the chief.

6.5.2.3 Discussion and conclusions

Based on the discussions of the formal and informal institutions that influence the ways the farmers from TIS behave, one has to conclude that it does not have a major influence on the behaviour of the farmers. The farmers fail to comply with the regulations associated with PTOs as a land tenure system. They also fail to comply with the rules and regulations of the Thabina Water Users' Association. While the failure to comply with the rules and regulations associated with the PTO does not necessarily affect the performance of the farmers, the failure to comply with the rules and regulations of the WUA has a direct impact on the performance of the farmers. The failure to enforce the rules of the WUA thus proves to be a major oversight and has to be sorted out as soon as possible. The case of TIS provides important evidence to show that institutions will not influence the behaviour or the farmers if the incentives are not correctly aligned. The poor performance of the farmers from TIS over the past two years means that the farmers have not received any returns for attempts to comply with institutions. Furthermore, since all of the produce normally is purchased by members of the surrounding communities, the farmers do not have to comply with stringent quality requirements associated with formal markets. Clearly the farmers from TIS currently have very little incentive to comply with any of the institutions. The correct alignment of incentives when implementing initiatives to link emerging farmers to commercial agri-food chains thus is crucial.

Based on the role that is played by the traditional authority in terms of allocating land and resolving conflicts between the farmers, one has to conclude that the chief has extremely high authority in the community. None of the farmers mentioned that they had to go to court to resolve any matter. By the time efforts to resolve conflict have reached the level of the traditional authority, the ruling by the chief is accepted as the final verdict. The conclusion is thus that the traditional authority has to be considered whenever any project is proposed for implementation at the TIS. The authority that the chief has in the community will contribute to the potential success of the project if the chief is in agreement with the proposed project.

Next, the focus of the analysis shifts to the analysis of the governance structures that fall under the third level of the New Institutional Economics framework.

6.5.3 GOVERNANCE STRUCTURES (LEVEL 3)

The analysis of the governance structures refers to the way the transactions between the farmers from TIS and their buyers are organised. Currently the farmers from TIS only use the spot market as a governance structure. This means that all parties have complete autonomy with regard to the decisions they make in the transactions. The farmers may sell their produce to whomever they like if they feel that the price is right. There is no relationship between the producers and their buyers that influence the outcome of the transaction.

Although all of the farmers use the spot market to govern their transactions, a comprehensive analysis is necessary to determine whether or not an alternative governance structure may be better for the farmers and their buyers in terms of reducing transaction costs. In order to find to optimal type of governance structure, one needs to have a comprehensive understanding of the characteristics of the transaction under consideration. The analysis of the governance structures thus starts with a description of the characteristics of the transactions within which the farmers from TIS participate, followed by the application of two decision-making frameworks to match the characteristics of the transaction to the appropriate type of governance structure.

6.5.3.1 Attributes of the transaction between producers from TIS and their buyers

According to the theory of Transaction Cost Economics, the attributes of a transaction that affect the level of transaction cost associated with the transaction (and hence the optimal choice of governance structure to organise the transaction) include, the levels of asset specificity, transaction uncertainty and the frequency of the transaction between the farmers and their buyers. For the purpose of analysing the levels of asset specificity associated with the transaction between the farmers from TIS and their buyers, a number of different types of asset specificity are considered. Those include physical asset specificity, site specificity, temporal specificity, and human asset specificity.

Physical asset specificity refers to the degree to which the farmers have invested in physical assets that are specific to the transaction under consideration. The farmers from TIS were asked whether or not they have their own equipment or implements to prepare their land, a hoe for weed control, equipment to apply fertiliser and chemicals, and whether or not they have their own vehicle that can be used to deliver the maize to the buyers. Out of the seven respondents, no one indicated that they have their own equipment or implements that can be used to prepare land, or to apply fertiliser. Only one respondent indicated that he/she has got a knapsack to apply chemicals, and also one of the seven respondents has his own vehicle that can be used to deliver produce to the buyers. The lack of investment in these physical assets implies that the levels of physical asset specificity by the farmers from TIS are low. On the other hand, all seven respondents indicated that they do have their own hoes that are used for weed control. However, although all of the farmers have invested in equipment for weed control, the fact that the same instrument can be used to control weeds when producing maize and vegetables that are sold to a different buyer, implies that the opportunity cost of the instrument is high. High opportunity cost of the asset under consideration again means that the level of asset specificity is low. The conclusion is thus that overall the levels of physical asset specificity in the transaction between the farmers from TIS and their buyers are low. Low levels of physical asset specificity again imply low levels of transaction costs and hence no need for higher degrees of vertical coordination.

From the farmers' side, there is evidence that the transactions between the farmers and their buyers are associated with moderate levels of site specificity. The farmers do not live on their farms. All of the investment in their farms is thus for the purpose of production. The very nature of the products that are produced at TIS implies that the transaction is also associated with moderate levels of temporal asset specificity. Temporal asset specificity refers to the situation where the value of the product is influenced by time. The value of the crops declines as time goes by after it has been harvested till they are sold. As the last type of asset specificity that is considered, the transactions between the farmers and their buyers are associated with low levels of human asset specificity. The levels of education and experience may be used as proxies for the level of human asset specificity. Higher levels of education and experience of transacting partners may be an indication of higher levels of human asset specificity. In the case of TIS, the average number of years of formal education (about five years) and farming experience (12 years) are low, which suggests that the levels of human asset specificity associated with the production of maize and vegetables are low. Low levels of human asset specificity in turn imply lower levels of transaction costs associated with transactions. However, the low levels of education and experience actually contribute to increasing the transaction costs faced by the farmers since they negatively influence their ability to search for strategic market information and the ability to effectively negotiate for better terms of trade with their buyers. Thus, although the low levels of education and experience do not contribute to transaction costs in terms of high levels of human asset specificity, one may conclude that they contribute to transaction costs by negatively affecting the ability of the farmers to mitigate opportunistic behaviour by their transacting partners.

The second attribute of the transactions that influence the optimal choice of governance structure relates to the degree of uncertainty associated with transactions. The very nature of agricultural production implies that there is a moderate level of uncertainty associated with transactions. The production of agricultural products is a biological process, which implies that one cannot have complete certainty with regard to the volume and quality of the produce before harvest. The farmers from TIS are not certain that they will receive sufficient amount of irrigation water to properly irrigate their crops. They also face uncertainty in terms of adverse weather conditions that may cause crop failures, as was the case during the past two seasons. Lastly, the farmers are not really certain whether or not they will have a buyer for their produce once it is harvested. The conclusion is thus that the farmers from TIS face moderate to high levels of uncertainty.

The buyers of maize and vegetables produced on TIS also face some uncertainty. The major uncertainty from the buyers' perspective relates to the ability of the farmers to produce sufficient volumes of vegetables that are of such a quality that the buyers can buy the crops and sell them to someone else. The transaction is thus associated with moderate to high levels of uncertainty both from the producers' and the buyers' perspectives.

As the last attribute of the transaction that causes transaction cost, the frequency of transactions between the farmers from TIS and their buyers is so low that it does not increase the transaction cost faced by the farmers. The small scale of operations means that the volumes of crops are so low that one or two transactions are sufficient to sell the whole harvest. Moreover, in the past two seasons there were no crops to sell. Consequently, there were no transactions between the farmers and their buyers.

Based on the analysis of the attributes of the transactions between the farmers from TIS and their buyers, the conclusion is that the transactions exhibit moderate levels of uncertainty, but low levels of asset specificity and transaction frequency. Given the characteristics of the transactions, one would not expect a high degree of vertical coordination to be necessary to govern the transactions. In the next section, the decision-making framework of Mahoney (1992) is used to match a governance structure with the characteristics of transactions.

6.5.3.2 Matching the characteristics of transactions with a vertical coordination strategy

The Mahoney framework makes a decision of the vertical coordination strategy by considering a transaction in terms of three conditions. The first condition considered is the level of asset specificity associated with the transaction. Secondly, the degree of separability is considered, while the final condition considered is the degree of programmability associated with a transaction.

Based on the above description of the characteristics of the TIS farmers' transactions, it was concluded that they exhibit low levels of asset specificity. Although the levels of site specificity and temporal specificity are moderate to high, overall the level of asset specificity can be considered to be low.

The condition of separability is concerned with whether or not it is possible to determine the contribution each party makes to the value of the product that is sold. In the case of the transactions between the farmers from TIS and their buyers, one may conclude that the level of separability is high. The farmers produce the maize and vegetables and sell them to their buyers. The buyers pay the farmers market-related prices. The farmers thus get rewarded for their contribution to the value of the final product. Similarly, the buyers buy the maize from the farmers, add value to the product and sell it to the buyer in the next node along the value chain. The buyer again gets paid market-related prices for the product and hence is rewarded for his contribution to the final value of the product. Given that there is a clear distinction in the contributions of each party to the value of the product, the conclusion is that the transactions exhibit a high level of separability.

As the last condition, the degree of programmability is concerned with the level of uncertainty associated with a transaction. The higher the degree of uncertainty the less programmable the transaction is. Based on the discussions above, the transactions exhibit moderate to high levels of uncertainty, and hence one may conclude that they are not programmable. Overall, the transactions can thus be said to exhibit low levels of asset specificity and programmability, but a high degree of separability. Based on the analysis of the transactions in terms of the three conditions, the decision-making framework of Mahoney (1992) would recommend that the spot market is the optimal choice of governance structure for the farmers from TIS. Based on this, one may conclude that the farmers from TIS are already using the optimal type of governance structure to organise the transactions between themselves and their buyers.

Next, a decision-making framework that was developed by Peterson *et al*. (2001) is used to determine whether or not there is a need for more vertical coordination.

6.5.3.3 Is there a need for more vertical coordination by maize and vegetable producers from Thabina?

The decision-making framework of Peterson *et al*. (2001) bases the decision of vertical coordination strategy on the answers to five interrelated questions. The current strategy will only be changed if the answer to all five questions is “yes”.

Question 1 – Is the current coordination strategy too costly?

The first question is whether or not the current strategy may be considered to be too costly. This is the case if the current strategy regularly exposes one of the parties to opportunistic behaviour by the other party, or if the current strategy regularly leads to over or under supply compared to demand. The costliness of coordination errors also increases with higher levels of asset specificity.

In the case of the farmers from TIS and their buyers, one may conclude that the farmers are exposed to opportunistic behaviour by their buyers. The farmers do not exhibit the necessary skills to source strategic market information that will allow them to negotiate for better terms of trade. The low levels of human capital of the farmers also negatively affect their ability to negotiate with their buyers. The current situation at TIS is also characterised by levels of supply that are insufficient to meet the demand. Although the transaction is associated with low levels of physical asset specificity, the moderate levels of site specificity, temporal specificity, and uncertainty mean that the costliness of coordination errors may be higher than the cost of a vertical coordination strategy. Given the fact that the farmers are exposed to opportunistic behaviour, and the fact that the level of supply is chronically insufficient to meet the demand, the answer to Question 1 is “yes”. This means that one should continue to the second question.

Question 2 – Will the alternative strategy reduce the costliness of the coordination error?
In essence the second question is concerned with whether or not the change in coordination strategy will be a better match between the costliness of coordination errors and the intensity of coordination control. A move to the right on the vertical coordination continuum implies an increase in the degree of coordination control.

In the case of the transaction between the farmers from TIS and their buyers, one may conclude that a higher degree of vertical coordination, such as specifications contracting or even relationship-based or equity-based alliances, may reduce the potential for opportunistic behaviour by the buyers. If the farmers are more involved with the decision-making process with their buyers there is less potential for the buyers to make decisions that will increase their benefit at the expense of the farmers. Similarly, higher degrees of vertical coordination will also enhance the flow of information to the farmers in terms of the volume and quality of produce that are required to meet the demand. A higher degree of vertical coordination may thus potentially decrease the costliness of coordination errors. The answer to the second question is thus "yes".

Question 3 – Is the alternative strategy programmable?
Question 3 is essentially concerned with the question whether or not there are effective, specific management routines for making the potential strategy workable (Wysocki *et al*., 2003). Currently at TIS, one has to conclude that the management routines required to make a higher degree of vertical coordination workable are not available. The low levels of human capital of the individual farmers mean that they definitely do not exhibit the necessary management routines. The inability of the management committee to substantially contribute to the performance of the farmers leads to the conclusion that the management committee also does not exhibit the necessary management routines. In order to get such management routines in place, the necessary skills will need to be sourced from outside the current setup of the TIS. At this stage, the conclusion is thus that a higher degree of vertical coordination in the transaction is not programmable.

Since one cannot conclude that a higher degree of vertical coordination would be programmable at this stage, there is no need to continue to the fourth question. A "no" answer to any question means that there is no need to change the current vertical coordination strategy.

6.5.3.4 Discussion and conclusion

When considering the characteristics of the transactions between the farmers from TIS and their buyers the conclusion is that they are characterised by low levels of physical asset specificity, but high levels of temporal asset specificity, site specificity and uncertainty. The high levels of temporal asset specificity, site specificity and uncertainty contribute to the high levels of transaction cost faced by the farmers from TIS. The farmers from TIS thus are exposed to

similar stumbling blocks than other emerging farmers in South Africa as documented in the literature, and as was found at Eksteenskuil and ZIS in this study. This leads to the question whether or not an alternative governance structure may reduce the transaction costs they face.

The application of the framework by Mahoney (1992) led to the conclusion that the spot market actually is the best type of governance structure available to the farmers from TIS. The application of the decision making framework of Peterson *et al*. (2001) led to the conclusion that there is no need to change the governance structure currently used by the farmers from TIS. The outcome of the application of the framework by Peterson *et al*. (2001) thus confirmed the recommendation from the application of the framework by Mahoney (1992). Given that both frameworks led to the same conclusion, one may conclude that the spot market that is currently used as a governance structure by the farmers from TIS is actually the best that they can currently use. Note, however, that if there is any change from the current situation, the analysis will need to be repeated to determine whether or not this changes the need for a higher degree of vertical coordination.

The conclusion that the vegetable producers from TIS actually are using the optimal type of governance structure given the characteristics of their transactions concludes this section. Next the value chain within which the farmers participate is mapped and analysed.

6.6 VALUE CHAIN MAPS FOR MAIZE AND VEGETABLES PRODUCED AT TIS

The starting point of any value chain analysis is to map the flow of the physical product from the input supplier, through all the different stages of value adding, to the end consumer. Keep in mind that no crops were sold during the past two seasons. Consequently no information is available on the distribution of the value of the maize and vegetables as they move along the channel from the farmers from TIS towards the end consumers. Despite the lack of information on sales and prices, the value chain within which the farmers from TIS normally participate is presented and discussed next.

6.6.1 FLOW OF MAIZE AND VEGETABLES FROM INPUT SUPPLIERS TO THE END BUYER

The flow of the physical product from the input suppliers to the end consumer is shown graphically by means of the product flow map in Figure 6.4. It is noted that both maize and vegetables are marketed through the same marketing channel.

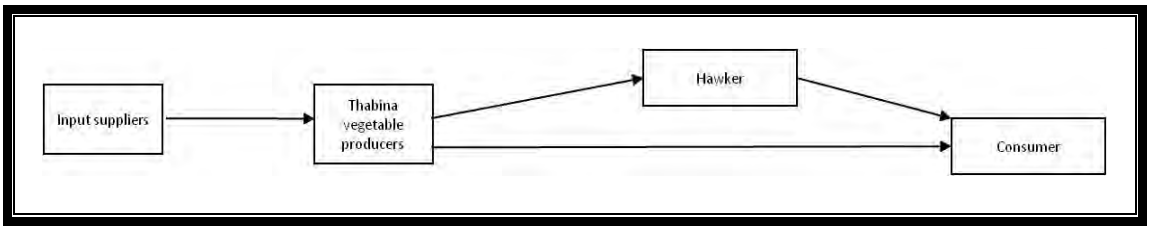

Figure 6. 4: Product flow map to show the flow of the physical product from the farmers to the end consumers.

Figure 6.4 shows that there are mainly two channels that are used by the farmers from TIS to move their crops from the farms to the end consumers. The majority of the maize and vegetables are sold to hawkers who again sell them to consumers. Although the hawkers do not add value to the produce by physically transforming it into a different product, the value that is added by the hawkers is in terms of place utility. The hawkers collect the maize and other vegetables from the farms and deliver it to different hawker stands from where it is sold to the public. The stands are located such that the consumers find it convenient to buy the produce from those stands. The value that is added is thus in terms of making the maize and vegetables available at locations that are convenient for the end consumers. The consumers consequently are willing to pay for the place utility they receive when buying produce from the hawker stands.

The second marketing channel predominantly used by the farmers from TIS is to sell the crops directly to the end consumer. Contrary to the hawkers, who add value in terms of place utility, the farmers do not deliver the produce to more convenient places for the consumer. Rather, members from the surrounding communities visit the farms to buy the produce from the farms.

Interestingly, neither of the two marketing channels exposes the farmers to substantial levels of marketing costs. While farmers do sometimes have to phone the hawkers to inform them about crops that are ready to be harvested, the members from the community visit the farms without any notification. One of the major benefits for farmers to sell their maize and vegetables to the hawkers and members of the community thus lies in minimal marketing costs. Another benefit of selling to the specific buyers is that the hawkers often bring their own harvesting team to make sure that they get the best quality crop available. Similarly, the members of the community often also harvest the maize and vegetables when visiting the farms to buy produce. The farmers thus also face low levels of labour cost since they do not have to pay workers to harvest the crops. Given the extremely low profit margins that are prevalent at smallholder irrigation schemes, the ability of the farmers to save on labour and marketing costs provide the farmers from TIS with a strong incentive to sell their crops predominantly to hawkers and members of the community.

Next the distribution of water use at the critical points along the value chains is assessed to identify those activities that have scope to improve the levels of efficiency with which the water is used to produce the vegetables, and to finally deliver it to the end consumer.

6.6.2 DISTRIBUTION OF WATER USE AT CRITICAL POINTS ALONG THE VALUE CHAIN

Given the crops that are produced and the value chains within which the farmers from TIS operate, the only node along the chain where water is used is on the farm. The farmers use irrigation water as a productive resource to grow the crops, and as a production input to dilute chemical pesticides and to wash some of the vegetables before selling them. The hawkers do not use any water to move the crop to conveniently located hawker stands. Although it is recognised that the consumers do use water to cook the products, for the purpose of this study the water that is used to cook is not considered.

Since the farm is the only node in the value chain where water is used, the levels of efficiency with which the water is used (crop per drop) can only be improved by focusing on the farmers. In order to optimise the water use along the whole value chain, the only way is to improve the level of efficiency with which the farmers use the water to produce the crops. Given that no maize or vegetables were sold by the farmers from TIS during the past two seasons no income was generated from the water that was used to produce the crops. By implication, the productivity of the water (income per cubic metre of water) that was used to produce the crops is zero. The problem is that water productivity of zero implies that the allocation of water to produce maize and vegetables at TIS proves to be an inefficient allocation of water. The objective of supplying the farmers from TIS with irrigation water to allow them to improve their livelihoods through irrigated agriculture is not met at all.

It is crucial to find a way to allow the farmers to be able to sell their crops in order to generate income and improve their livelihoods from having access to irrigation water. Recall that the farmers and other value chain players do not operate in isolation (Roduner, 2005). The value chain players are influenced by the rules and regulations that have to be met, and by the support structures that support the farmers to meet the regulations specified by the influencers. Next, the discussion moves to a description of the value chain influencers that influence the behaviour of the farmers, and the available support structures that can help the farmers to generate income from their crops.

6.6.3 VALUE CHAIN INFLUENCERS

Given that the farmers from TIS produce food crops, there are a number of health and safety rules and regulations that have to be met to allow the farmers to sell their produce through the formal markets. Failure to comply will mean that the farmers will not be able to sell their produce

to buyers in the formal markets. Given the current situation at TIS the farmers, however, show little aspiration to sell their produce to buyers from the formal markets. The farmers also prove not to make any special effort to meet health and safety requirements. One thus may actually conclude that the strict health and safety rules and regulations do not really influence the behaviour of the farmers from TIS. The farmers, however, need to keep in mind that whenever they want to market their produce through formal markets they will have to comply with such rules and regulations.

As documented in the section concerned with the analysis of the institutional environment within which the farmers operate, the main influencers that affect the behaviour of the farmers from TIS include the constitution of the Thabina WUA and the Thabina Farmers' Cooperative, and also the informal rules imposed from the side of the tribal authority. The constitution of the Thabina WUA aims to influence the irrigation behaviour of the farmers from TIS. The farmers, however, fail to comply with the rules, as is evident from the conflicts related to water use on the scheme. The constitution of the Thabina Farmers' Cooperative specifies codes of conduct that the farmers have to meet in accordance to the functioning of an agricultural co-operative under the Co-operatives Act [No. 14 of 2005].

With regard to the influence of informal institutions on the behaviour of the farmers from TIS, the tribal authorities have the responsibility to allocate land to the farmers. Farmers who do not cultivate their land may be approached by the chief to find out why the land is not cultivated. The chief then can allocate the land to another person if necessary. The traditional authorities thus also influence the behaviour of the farmers by influencing the incentive to actively cultivate their land.

Next the focus shifts to the support structures that are responsible for supporting the farmers from TIS to comply with the rules and regulations of the value chain influencers.

6.6.4 VALUE CHAIN SUPPORTERS

Given the poor performance of the maize and vegetable producers from TIS over the past number of years one would have expected that some organisations would have been linked to the farmers to support them to overcome the major challenges that constrain their performance. According to Rikoto (2011), however, the only entity that tries to support the farmers from TIS is the government. No other organisations are involved with the farmers from TIS in a supportive capacity.

As part of the revitalisation of the TIS where the three centre pivots were installed in Wards C and D, there is an initiative to link the farmers from the TIS to a commercial farmer in the region to act as a mentor. As first evidence that government acts on its commitment in CRDP (2010) to

create strategic partnerships between emerging farmers and key role-player in value chains the Department of Rural Development and Land Affairs approached a number of prosperous commercial farmers in the region to come up with a proposal of how they would go about supporting the TIS farmers to successfully cultivate the land under the centre pivot irrigation systems. Based on the proposals, Beerseun Boerdery was selected as the company to mentor the farmers. Beerseun Boerdery specialises in the production of baby vegetables. They also have packing facilities to add value to their vegetables before selling them to a number of supermarkets under contract. The idea is that the farmers from TIS produce vegetables under the centre pivots under the guidance of Beerseun Boerdery. Beerseun Boerdery then will buy the vegetables from the farmers, add some value to them and distribute them through their existing marketing channels. The farmers, however, will have to meet the quality standards and health and safety requirements to sell their vegetables to Beerseun Boerdery. The representatives from Beerseun Boerdery, however, will support the farmers to meet such requirements. As indicated by De Beer (2011), Beerseun Boerdery will have a vested interest in the performance of the farmers from TIS. Consequently, Beerseun Boerdery has a strong incentive to support the farmers to produce high volumes of good quality vegetables. The relationship, however, still is in its early stages and no agricultural activities have taken place yet.

Interestingly, it was decided that Beerseun Boerdery should become a mentor rather than a strategic partner. According to Rikoto (2011), strategic partnerships are known for situations where the commercial farmers come with money, tractors and implements to cultivate the land and then they leave with a large share of the profits. The idea behind the mentorship relationship with Beerseun Boerdery rather is to get the commercial farmers to transfer the skills to the farmers. While Beerseun Boerdery will be rewarded for their efforts, the lion's share of the profit will still go to the pockets of the farmers from TIS.

Thus, although government was considered to be the only supporter of the farmers from TIS, there are good prospects for the involvement of a highly successful company that also produces vegetables and add value to them before selling them. Based on the discussions with the members of the management committee of the Thabina Farmers' Cooperative and the owner of Beerseun Boerdery, one may conclude that the idea on which the relationship is based has great potential to uplift the farmers from the TIS.

The effect of correctly aligned incentives again is very much evident in the case of TIS. As soon as Beerseun Boerdery (a commercial farming enterprise) recognised the potential financial benefit from dealing with the farmers from TIS, it was willing to enter into a relationship with the farmers. It is important to note that the relationship between Beerseun Boerdery and the farmers from TIS entails the provision of a market outlet for crops produced by the farmers from TIS, and also the transfer of skills to the farmers. The relationship thus has great potential to

contribute to meeting important recommendations from NDP (2011) and CRDP (2009; 2010). More specifically, the relationship will contribute to, amongst others, providing innovative market linkages for small-scale farmers (NDP, 2011); putting preferential procurement mechanisms in place (NDP, 2011); and improving skills development (NDP, 2011; CRDP, 2009). Thus, by implementing the recommendation from CRDP (2010) to form strategic partnership, the benefits from the relationship (although not a strategic alliance) contribute substantially to meeting other objectives and recommendations. Government thus should make a big effort towards implementing its plans and recommendations to allow rural communities to start benefiting from such plans.

In the next section problem tree analyses are used to identify the major stumbling blocks that constrain the performance of the farmers from TIS.

6.7 ANALYSIS OF CRITICAL POINTS IN THE VALUE CHAIN

The critical points that act as stumbling blocks that constrain the performance of the maize and vegetable producers from TIS are analysed by means of a problem tree analysis. Problem tree analyses aim to map the causal relationships between the problem and all of its possible causes. For the purpose of analysis, the farming unit of the farmers from TIS is divided into a production sub-decision making unit and a marketing sub-decision making unit.

6.7.1 PROBLEM TREE ANALYSIS OF PRODUCTION SUB-DECISION MAKING UNIT

The main problem facing the maize and vegetable producers from TIS in the production sub-DMU is the fact that they produce too low volumes of good quality crops to sustainably participate in commercial agri-food chains. A problem tree analysis is conducted on the production sub-DMU to determine the factors that are constraining the ability of the farmers to produce high volumes of good quality crops. The problem tree is shown in Figure 6.5.

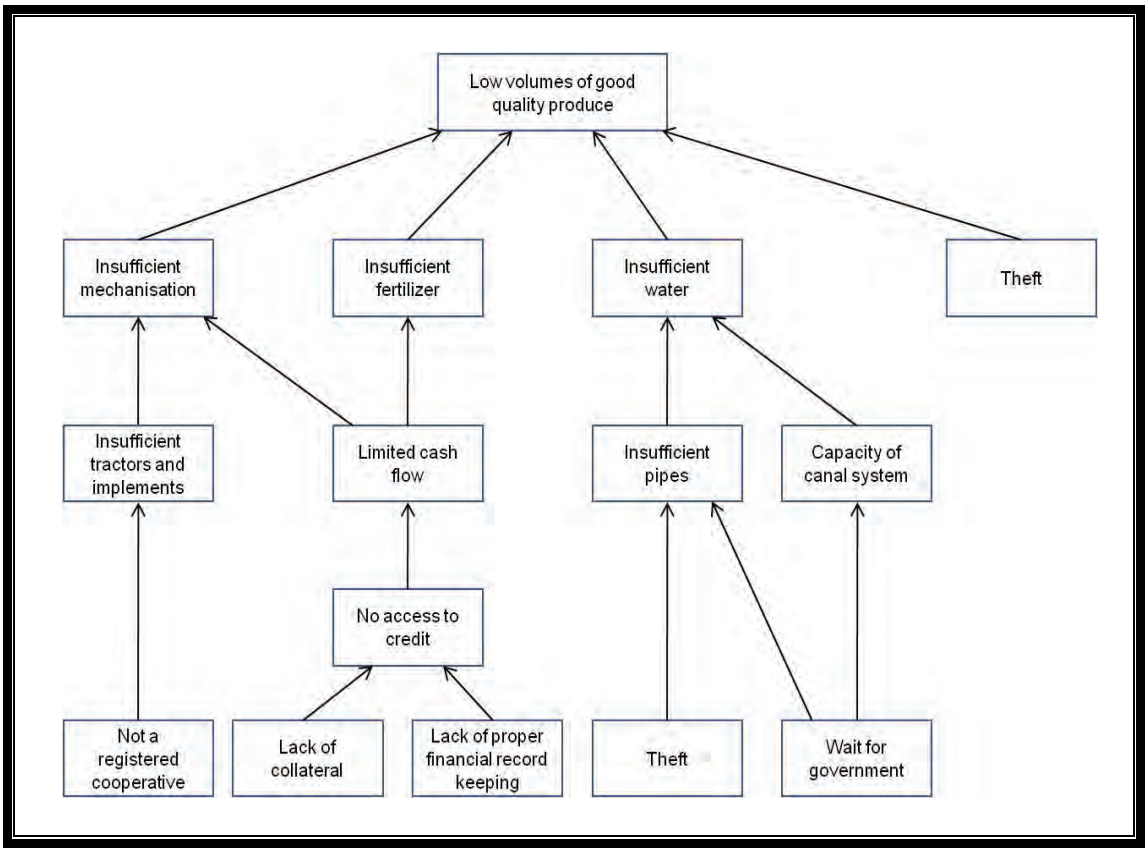

Figure 6. 5: Problem tree to investigate low volumes of vegetables produced by producers from Thabina Irrigation Scheme.

Figure 6.5 shows that there are mainly five reasons listed by the farmers from TIS that constrain their ability to produce high volumes of good quality crops required by buyers in commercial agri-food chains. Those include insufficient levels of mechanisation, insufficient fertiliser, insufficient water, adverse weather conditions, and theft of crops. Interestingly, the constraint that was listed first by most of the respondents relates to **insufficient mechanisation** to allow them to cultivate their land. During the interviews one could sense the frustration of the respondents with regard to the current level of mechanisation on the scheme. According to Rikoto (2010), previously there were a number of tractors and implements on the scheme, the new government after 1994 took them back. Currently there are no tractors and implements on the scheme that can be used by the farmers to cultivate their land.

A reason given by the respondents for the lack of tractors on the irrigation scheme is that government does not want to give them tractors and implements since they have **not** yet established **a co-operative** as a collective business entity for the farmers from TIS. They have indicated that government has promised to give them the necessary tractors and implements once they register the co-operative. Rikoto (2011) indicated that there are prospects that the Department of Rural Development and Land Affairs may sponsor some tractors and implements as part of the revitalisation project that is currently running on TIS.

The lack of tractors and implements on TIS means that the farmers are dependent on contractors to perform mechanised activities on their farms. The fees charged by the contractors are perceived to be very expensive. The **lack of cash flow** means that the farmers do not have the necessary means to afford the services of contractors to perform mechanised labour. Failing to sufficiently prepare their land before planting negatively affects their yields. The lack of cash flow is mainly caused by the **lack of access to credit** due to unavailability of the necessary **collateral** that is required by commercial credit providers, and the **lack of proper financial record keeping** by the farmers. Also keep in mind that the farmers failed to harvest a decent crop in the past three years.

Similar to the other case studies, the second reason listed by the farmers from TIS relate to their inability to apply sufficient volumes of the recommended **fertiliser** to ensure good yields. The timely application of the recommended levels of fertiliser is crucial for the production of large volumes of good quality crops. The respondents indicated that they do not apply sufficient volumes of fertiliser, and they also normally are not able to apply the fertiliser at the recommended times. The main reasons for the inability to apply the recommended amounts of fertiliser are the fact that the farmers have **limited cash flow** and hence they often do not have cash available to buy the fertiliser. Again, the farmers only have limited cash flow since they do not have **access to credit** since they do not have the **collateral** that are required to get access to credit from commercial credit providers, nor do they keep sound **financial records** that are required by credit providers.

The third main cause for the low volumes of produce produced relate to **insufficient water** to irrigate all of their land. The respondents argue that they do not have sufficient irrigation pipes to irrigate all of their land. Thus, although they only farm on small pieces of land, they do not have sufficient number of pipes to be able to cultivate all of their land at a time. Again the farmers highlighted two main reasons why they believe that they do not have sufficient irrigation pipes. Firstly, they argue that their irrigation pipes get **stolen** from their farms. The farmers do not reside on their farms hence there is no one to keep an eye on their fields at night. The pipes then often get stolen at night when nobody is there. The second reason listed by the respondents why they do not have sufficient number of irrigation pipes is that they are still **waiting for government** to deliver on a promise to provide them with more irrigation pipes. Since the farmers have not yet received the promised pipes they are unable to cultivate all of their land, and consequently they produce only low volumes of maize and vegetables. Another reason for the insufficient amount of irrigation water is the fact that the **capacity of the canal system is too small** to supply all farmers with sufficient amounts of water. During the revitalisation of the irrigation scheme the farmers also requested that the canals be heightened to increase the capacity of the canal system. The canals, however, were never heightened as promised. The capacity of the canal system thus remains a main cause for the low volumes of maize and vegetables produced at TIS.

The last two causes for low yields that were mentioned by the farmers include adverse weather conditions, and the problem of **theft**. During the past two years the farmers from TIS were struck by severe hail storms and heavy rains which saw the crop yields complete damaged for two consecutive years. The farmers also indicated that a lot of their crops get stolen and hence cannot be sold to generate income. The last two stumbling blocks thus do not really reflect on the ability of the farmers to produce maize and vegetables. However, both still contribute to the low volumes of crops that are produced by the farmers from TIS. Next some leverage points are discussed that may potentially be exploited to support the farmers to overcome the stumbling blocks that constrain their performance.

6.7.2 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING MAIZE AND VEGETABLE PRODUCTION AT TIS

From the problem tree in Figure 6.5 it is evident that the lack of cash flow of the farmers has a major influence on the inability of the farmers to produce high volumes of good quality produce. Evidently, if the problems that constrain the cash flow positions of the farmers can be overcome, there is huge potential to improve the performance of the farmers from TIS. Recall that the lack of cash flow is caused by the lack of access to credit, which in turn is caused by the farmers' lack of collateral, and the fact that the farmers do not keep sound financial records that are required by commercial lending institutions. The very nature of being emerging farmers means that the farmers typically do not have assets that can serve as collateral for commercial credit. The only way that emerging farmers could have the required collateral is if they would have the title deeds for their land. The title of the land at TIS, however, is in the name of the traditional authority. The individual farmers only have PTOs for the land. Speeding up the process of tenure reform to transfer secure tenure to individual farmers (CRDP, 2009) thus may have a significant positive impact on the farmers from TIS. Support and training in financial record keeping may enable the farmers to keep sound financial records. Commercial lending institutions require from applicants to submit financial records to demonstrate their ability to repay the loan. Sound financial records may convince the lending institutions that the farmers would be able to repay the loan. Based on the financial projections, the lending institutions then may decide to award the credit to the farmers. Support and training in financial record keeping thus have huge scope to improve the performance of the vegetable producers from TIS. Such support and training is not the sole responsibility of government. Private sector also has a role to play. Government may rather focus on identifying appropriate incentives that will convince private sector to get involved.

The other potential leverage point, however, is in the hands of government. If government was to deliver on promises to provide the farmers from TIS with tractors and implements, the farmers would be able to properly prepare their land prior to planting. Proper preparation of the land may contribute substantially to increasing the yields that the famers are able to generate (De Beer,

2012). Government should also meet their promises to supply more irrigation pipes, and to increase the height of the canals at TIS to increase the capacity of the canal system. Insufficient water supply was rated as a major stumbling block by the farmers. Despite the small plot sizes, some of the farmers indicated that there is insufficient irrigation water available to allow them to cultivate all of their land in a single season. Some of the farmers actually raised their frustration with the fact that government has decided to install centre pivots while "that was not what the farmers wanted". Those farmers argue that it would have been better if government was to increase the capacity for water supply by heightening the canals. Ultimately, government should focus on delivering the services that the farmers expect. As a matter of fact, the role of government is to provide the farmers with an enabling environment.

The conclusion is thus that the overcoming of the stumbling blocks will require a joint effort by government and private sector. Government should focus on creating and sustaining an enabling environment, and creating incentives for private sector to get involved with the support and training of the farmers from TIS. Private sector then has to step up to the plate and get involved. Next, the stumbling blocks that constrain the performance of the marketing sub-decision making unit of the farmers from TIS are investigated.

6.7.3 PROBLEM TREE ANALYSIS OF MARKETING SUB-DECISION MAKING UNIT

The function of the marketing sub-DMU is to convert the produced crops into the maximum possible revenue. Figure 6.6 shows the problem tree for the marketing sub-DMU. The major problem faced by the marketing sub-DMU of the farmers from TIS is the fact that they generate too little income from their produce to allow them to improve their livelihoods. Based on discussions with the farmers, there are mainly four reasons that contribute to the low income they earn from their crops. Firstly, the volumes that are produced are so low that they cannot generate sufficient income from their crops to sustain their livelihoods. Secondly, the quality of the crops is such that the prices that the buyers are willing to pay are low. The third reason that was mentioned is the fact that the farmers sometimes produce the wrong varieties and hence struggle to sell the produce at good prices. Lastly, it was mentioned that the lack of coordination between the farmers means that the buyers actually use the farmers to bargain for lower prices.

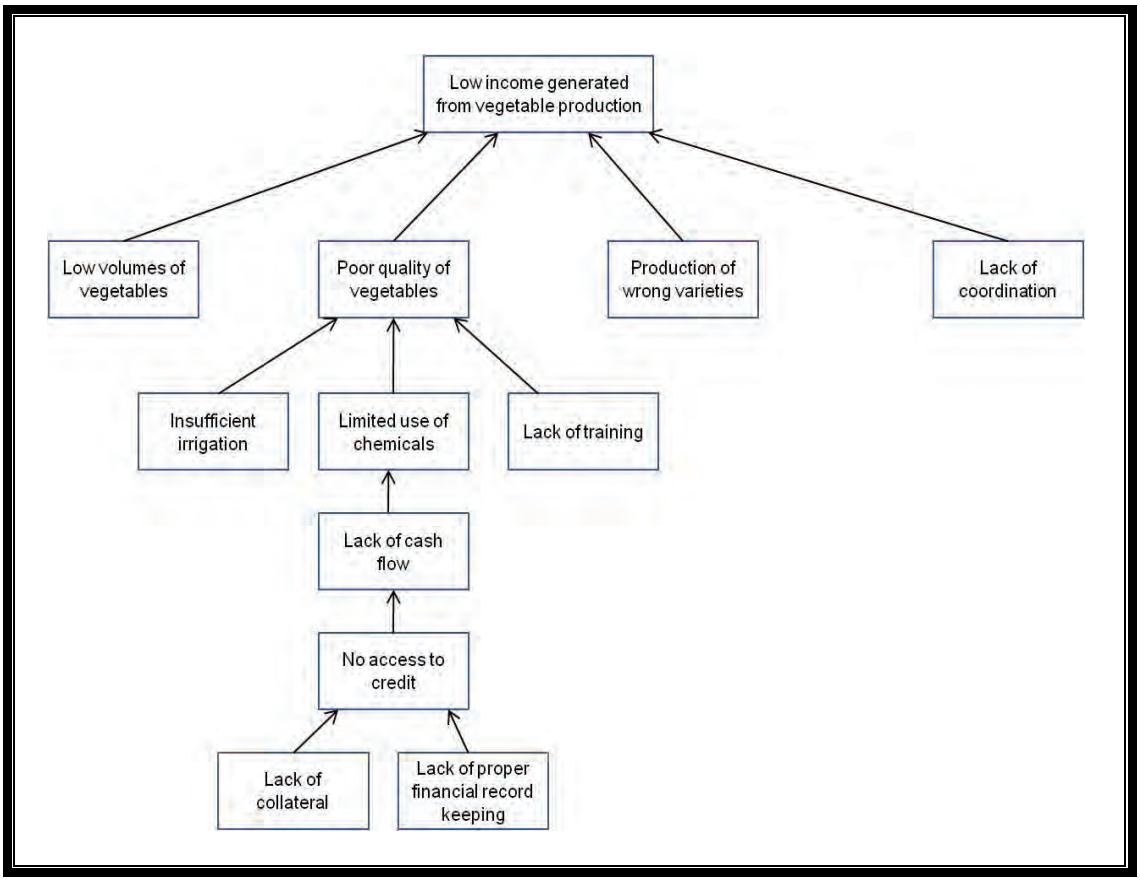

Figure 6. 6: Problem tree of the marketing sub-decision making unit of the vegetable producers from TIS.

The reasons that contribute to the low volumes of produce have already been discussed. The reasons mentioned to negatively affect the quality of the produce include the **lack of training** in the production of good quality vegetables, the fact that there is **insufficient irrigation water** available to properly irrigate the crops especially during growth stages when sufficient water is crucial, and the fact that the farmers very seldom use **chemicals** to manage pests. The lack of training actually is a symptom of the lack of support structures, which were discussed as part of the value chain supporters above. The lack of sufficient irrigation water and its causes were also discussed under the stumbling blocks faced by the production sub-DMU. The reason that was given by the farmers for not being able to use chemicals to manage pests is the fact that they do not have sufficient **cash flow** to buy the chemicals to allow for timely application.

The reasons for producing the wrong variety of vegetables include ignorance due to **lack of information** from the buyers. The problem of the low income generated from the production of maize and vegetables thus relates very much to the inability of the farmers to produce a large volume of good quality vegetables.

6.7.4 POTENTIAL LEVERAGE POINTS TO OVERCOME STUMBLING BLOCKS CONSTRAINING THE MARKETING OF MAIZE AND VEGETABLES

Given the impact of the low volumes of crops that are produced as a cause for the low levels of income generated from maize and vegetable production, most of the leverage points that aim to improve the income of the farmers relate to improving their levels of production. The only leverage point specific to the marketing of the maize and vegetables relates to the coordination of production and marketing activities. A higher degree of coordination will contribute to reducing the level of competition between the farmers to prevent buyers from being able to bargain for lower prices by threatening the farmers that they would rather go to the neighbour to by the produce at lower prices. Higher degrees of coordination may also contribute to a more consistent supply of good quality produce. A more consistent supply of good quality produce, in conjunction with policies that aim to incentivise buyers to deal with emerging farmers, may contribute to making the farmers from TIS more favourable as a supplier of fresh produce. Higher degrees of coordination may also allow the farmers to benefit from economies of scale. Thus the potential spin-offs from a higher degree of coordination between the farmers are vast.

Overall, one may conclude that there are a number of potential leverage points to be exploited to improve the performance of the maize and vegetable producers from TIS. Improving their performance will mean that their livelihoods will benefit from having access to irrigation water. The level of efficiency of the decision to allocate water to them will thus also be improved. This discussion of potential leverage points that may contribute to improving the performance of the vegetable producers from TIS concludes this case. The next section concludes by providing a brief summary of the conclusions that can be drawn from the results, as well as recommendations.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The aim of Chapter 7 is to conclude this study by presenting and discussing the conclusions that were drawn from the results of the research, and by discussing some recommendations to emerging farmers, policy makers and researchers to contribute further to optimising economic beneficial water use and the successful integration of emerging farmers into commercial agri-food chains.

7.2 CONCLUSIONS

Value chain analysis was conducted in this study to optimise economic beneficial water use and to identify potential success factors that may contribute towards the successful participation of emerging farmers in commercial agri-food chains. The conclusions that were drawn from this study are discussed in two sections. The first section is concerned with the conclusions that were drawn from the literature review and the developed conceptual framework. The second section covers the conclusions that were drawn from the application of the conceptual framework in the three case studies.

7.2.1 CONCLUSIONS FROM THE LITERATURE REVIEW AND THE CONCEPTUAL FRAMEWORK

The main conclusion from the literature review is that, in order to meet the aim of this study, the focus of attention should go beyond the actors who are directly involved with moving the physical product from the input suppliers to the end consumers. A number of stumbling blocks were identified that typically exclude emerging farmers from participating in commercial agri-food chains. Those stumbling blocks include, amongst others, the fact that emerging farmers normally do not operate in an enabling environment; stringent quality requirements and other consequences of institutional failure (i.e. small scale of operations, insecure property rights, and lack of access to credit); high transaction costs (due to poor condition of physical infrastructure, lack of trust among market actors, lack of market information, and the distance to the market); and the lack of support to overcome the stumbling blocks. In order to identify potential success factors that will contribute towards the successful participation by emerging farmers in commercial agri-food chains, the conceptual framework thus also needs to consider the physical

and institutional environments within which the farmers operate, the attributes of the transaction between the farmers and their buyers, and potential support structures that may support the farmers to overcome the stumbling blocks.

For the purpose of this study the analysis of the value chain is concerned with the distribution of value and water use along the value chain in order to optimise economic beneficial water use along the value chain. The analysis of the value chains at all three levels (value chain players, value chain influencers and value chain supporters), however, puts the focus of attention beyond only the actors who are directly involved with the physical product (players). Special attention is also awarded to the rules and regulations that provide the regulatory framework (influencers) within which the value chain players operate, and the available support structures (supporters) that can support emerging farmers to comply with the rules and regulations specified by the influencers. However, it is not sufficient for the analysis of the value chain influencers to consider only the institutional environment. Emerging farmers are also constrained by their physical environment and the nature of the transactions between them and their buyers. The conceptual framework should also capture the influence of the physical environment on the value chain players. The analysis of the value chain players should also be extended to consider the nature of the relationships and transactions between the value chain players. The integrated New Institutional Economics (NIE) and Structure-Conduct-Performance (SCP) framework allows for a comprehensive analysis of the behaviour and performance of economic agents within their social, physical and institutional environment. The integrated NIE-SCP framework thus allows for extending the analysis of the value chain influencers to also consider the social (Social embeddedness) and physical (Structure) environment within which the farmers operate. The analysis of the conduct of the value chain players and the governance structures that govern the relationships between the value chain players allow for an in-depth analysis of the actors who are directly involved with moving the physical product from the input suppliers to the end consumer. Special attention is awarded to the attributes of the transaction and the optimal type of relationship between market actors based on the attributes of the transaction. The NIE-SCP framework also extends the analysis of the value chain players to also focus the attention on the current levels of performance of the value chain players (performance) and the potential to improve their performance through the efficient allocation of their resources (resource allocation).

In addition to the NIE-SCP framework, problem tree analyses focus the attention on the practical challenges faced by value chain players in their day-to-day activities. The combination of the problem tree analyses and the NIE-SCP analysis thus ensure a comprehensive understanding of the current situation and the reasons underlying the behaviour and performance of market actors in the current situation. The width and depth of the focus of the different components suggests that the conceptual framework that consists of a problem tree

analysis, and a NIE-SCP analysis of the value chain at all three levels (players, influencers, and supporters), is appropriate to meet the aim of this study.

7.2.2 CONCLUSIONS FROM THE APPLICATIONS OF THE CONCEPTUAL FRAMEWORK AND EMPIRICAL MODELLING OF SELECTED VALUE CHAINS

The overall conclusion from the application of the conceptual framework at the respective case studies is that the application of the conceptual framework have resulted in a better understanding of the reasons underlying the behaviour and performance of the farmers. Ultimately it allowed the identification of potential solutions that may contribute to optimising water use along the value chains, and the identification of key success factors that will contribute to the successful participation of emerging farmers in commercial agri-food chains. For the purpose of discussion the section is divided into the conclusions that relate to agri-food chains, optimising water use in agri-food chains, and uplifting emerging farmers.

Conclusions with respect to agri-food chains

An interesting finding from the analysis of the agri-food chains is that the marketing channel that is associated with the highest total value added to the underlying product often is not the channel that maximises the return from the farmers' perspective. Recommendations to emerging farmers with regard to the specific marketing channel to follow within the value chain thus have to be handled with great care. The conclusion thus is that a comprehensive analysis of the distribution of value along the value chain is a key success factor to ensure that farmers are advised to follow the appropriate marketing channel that will allow them to benefit optimally from participating in commercial agri-food chains.

The support of emerging farmers to produce good quality produce is another key success factor. The results show that the different degrees of enforcement of quality requirements between different marketing channels effectively regulate the distribution of the products from emerging farmers through the value chain. While good quality produce has access to all of the different marketing alternatives, crops of lesser quality only have access to certain marketing alternatives. Thus, while moving the bulk of crops through marketing alternatives that are not associated with the highest return may seem like a sub-optimal decision at face value, the distribution of crops through those channels may be the best option that is really available for the farmers given the attributes of the crops they have produced. The farmers need support to produce crops that meet quality requirements that will give them access to high paying market options in the value chain.

Additional evidence of the importance of the support for emerging farmers to produce good quality produce relates to potential benefits associated with vertical integration along the value

chain. The findings from the analyses of the value chains show that most value may be added in the secondary processing (i.e. using raisins in the baking industry), while little of the added value is distributed back to the farmers. Farmers may want to investigate the potential for vertically integrating (i.e. from contracting to complete vertical integration) along the value chain to increase their share in the final product. If vertical integration into the next node (primary processing) is infeasible it may possibly be feasible to integrate into the secondary processing node. The primary processing activity then can be outsourced to firms that have the capacity to do so. The attributes of the product (i.e. quality), however, have a major impact on the ability of the farmers to vertically integrate into such value adding activities. The conclusion thus is that one needs to have a clear understanding of the attributes of the products that are produced by the emerging farmers before advising them to vertically integrate along the value chain to increase their share in the value of the final product. Supporting farmers to meet the quality requirements will allow the farmers to explore all possible ways through which they can increase their share in the value of the final product.

Optimising water use in agri-food chains

The results showed that the marketing alternative which is associated with the highest total value added to the underlying product, and hence the highest total value added to the water that was used along the value chain, is not necessarily the marketing channel that will maximise the return to the water use at the farm gate for the farmer. The conclusion thus is that there may be conflicting interpretations of the optimal use of water in agri-food value chains since it depends on the initial objective for giving emerging farmers access to irrigation water. If the objective was to allow emerging farmers to improve their livelihoods through irrigated agriculture the optimal use will be for farmers to sell the bulk of their crops through the marketing channel that maximises the income at the farm gate. However, if the objective is to maximise the total return to the water that was used along the whole value chain, the optimal use would be to sell the bulk of the crop through the channel that adds the largest value to the underlying product, which often is through the agro-processing industry. The reason for the difference is the fact that not all marketing channels distribute the same proportion of the total value of the product to the farmers.

Another finding from the investigation of water use along the value chain is the fact that the bulk of the water (in excess of 99%) is used at farm level. The conclusion thus is that efforts to improve the efficiency with which water is used along the value chain thus need to be focussed on water use at farm level. It is interesting to note that, despite the fact that the bulk of the water is used at farm level, none of the farmers knew the exact amount of water they have applied to produce their crops. It is also concluded that the reason behind the ignorance of the farmers with regard to the amount of water they use is the fact that the institutions related to water use are not enforced. Farmers have no incentive to measure or save irrigation water, nor is there

any sanction that is enforced if farmers fail to comply with the institutions. It is interesting to note that at Eksteenskuil and ZIS, the failure to comply with the institutions have no serious implications in the short run since the capacity of the water distribution network and the availability of water is such that water is not considered to be scarce. The farmers from those two schemes believe that they do have secure access to water although they have not received secure water use entitlement. The problem arises once water becomes scarce, i.e. due to the insufficient capacity of the water distribution network as is the case at TIS. Once water becomes scarce it is even more important to be distributed such that everybody has equal access to the scarce irrigation water. Failure to comply with the institutions in such a scenario has some serious implications of which conflict amongst the farmers (water users) may even be the worst (as is the case at TIS). Conflict directly affects the performance of the farmers and hence the return that is generated from the water. The poor performance of the farmers may ultimately raise the question whether the allocation of water to such poor performing farmers is an efficient use of the scarce resource. Thus, although one may initially feel that the farmers will benefit from being lenient not to enforce the institutions, in the long run it is in everybody's best interest that the institutions are enforced to ensure the efficient use of water.

Conclusions from the analyses of key success factors that will help emerging farmers to successfully participate in commercial agri-food chains

The results from the SCP- and problem tree analyses at the respective case studies show that the farmers from the respective study areas face similar constraints than those that were identified in the literature. At all three study areas the respondents operate on small pieces of land and mostly without secure tenure. The road and water distribution networks are in a poor condition, and the farmers do not have access to credit to supplement their cash flow. The wide spread presence of these constraints suggest that emerging farmers from South Africa typically do not face an enabling environment. Other stumbling blocks that were identified include the lack of sufficient support structures and the unavailability of market information, except in the case of Eksteenskuil. The farmers from Eksteenskuil receive ample support from their collective entity (EAC) and the raisins processing company (SAD) who buys their raisins. The conclusion is that the support from key role-players (i.e. private sector companies) who operate in the value chain may be another key success factor that will contribute to the successful participation of emerging farmers in commercial agri-food chains.

Another finding from the problem tree analyses is that the stumbling blocks are very much integrated. The integratedness of the different stumbling blocks is also very much explained by the interaction between the different levels within the NIE-SCP framework. Activities in the lower levels (i.e. behaviour and performance) result from the environment (social, physical and institutional) that is created in the upper levels within the framework. The stumbling blocks actually are located in different levels within the NIE-SCP framework. Cognisance should be

taken of the potential impact of recommended changes in the upper levels on the activities in the lower levels. If the conditions in the upper levels (social embeddedness, institutional and physical environments) are not adjusted accordingly, any changes that are implemented in the lower levels (conduct, governance structures, performance, and resource allocation) likely will not result in sustained changes in the activities at the lower levels. A key success factor to overcoming the stumbling blocks faced by emerging farmers thus is that efforts to overcome the stumbling blocks should be coordinated instead of focussing only on one or two of the stumbling blocks at a time.

Conclusions from the NIE-analyses at the respective case studies contribute more insight into potential reasons for the difference in the degree of success with which the groups of farmers participate in their value chains in the process of identifying potential solutions. From the results of the analyses of the social embeddedness of the farmers from the different case studies it is concluded that cultural aspects and social capital of farmers have a major influence on the behaviour and performance of emerging farmers. While the social capital levels prove to be relatively high at all of the different study areas, there is a substantial difference in the degree to which cultural activities influence the behaviour of the farmers. Substantially less cultural activities and cultural differences are present in the case of Eksteenskuil compared to ZIS and TIS. Of the different groups of farmers in this study the farmers from TIS are the most influenced by cultural issues. At TIS there is conflict between the farmers from the two different ethnic groups where each group believes that the farmers from the other group act opportunistically at their expense. This conflict has a major negative impact on the collective behaviour and performance of the farmers from TIS. While there are no clear culture related conflicts at ZIS some of the farmers do participate in cultural activities at the expense of their farm businesses. The farmers from ZIS thus are affected more on an individual basis compared to the farmers from TIS who are collectively hampered by the cultural conflicts. The findings from the analyses of the social embeddedness of the farmers thus suggest that the smaller the influence of culture is on the behaviour of the farmers, the better the farmers are able to perform. A key success factor for the successful participation of emerging farmers in commercial agri-food chains thus is to ensure that cultural activities that may potentially be detrimental to the performance of emerging farmers are identified and strategies formulated to minimise its impact on the performance of the emerging farmers. Special attention should be awarded to identifying activities that will contribute positively towards increasing the levels of social capital of the farmers.

The results from the analyses of the institutional environments at the respective case studies show that emerging farmers are severely constrained by tenure insecurity, and emerging farmers are willing and able to comply with the strict rules and regulations if the incentives are correctly aligned. Tenure insecurity leads to farmers not being able to supplement their cash flow through credit, and to farmers not being able to increase their scale of operations. Again

the results thus show that the environment in the upper levels has a major impact on the activities in the lower levels, and also that the institutional environment have a direct impact on the physical environment within which the farmers operate. The case of Eksteenskuil proves that emerging farmers are able to meet the stringent requirements associated with the export of raisins through the fair-trade initiative. The farmers receive a substantial price incentive (fair-trade price and a fair-trade premium) to comply with the institutions, while failure to comply is sanctioned by the cancelation of the FLO-accreditation of the whole group of farmers. The farmers receive ample support from EAC and SAD to comply with the requirements. The fair-trade initiative has also created an incentive for SAD to support the farmers from Eksteenskuil which SAD can only access through the volume of raisins that are exported. SAD thus has a vested interest in the performance of the farmers from Eksteenskuil. The farmers have also organised themselves as the EAC specifically to improve their ability to comply with the requirements of fair-trade. The establishment of the co-operative has created additional institutions that have to be complied with. Instead of viewing the strict rules and regulations as a barrier to entry that exclude the farmers from the market, the farmers instituted even more rules to help them to comply with the rules of fair-trade. The conclusion is that, if the incentive is strong enough, emerging farmers are willing to comply with the rules and regulations in the institutional environment, and even to use institutions to help them comply. The case of ZIS also presents an example of emerging farmers who created an innovative institution by their own initiative to get access to a correctly aligned incentive. The farmers have instituted a rule that enable them to effectively leverage the production inputs that are sponsored by government in order to give more farmers access to higher levels of production inputs. For most farmers it is the only way of getting access to higher levels of inputs than the amounts sponsored by government. The sanction for a farmer who fails to service his co-operative account is that he cannot buy inputs on his account the next season. The farmers from ZIS prove to comply with this institution.

The case of TIS, on the other hand, is good example of the inability of institutions to influence the behaviour of emerging farmers if the incentive for compliance is insufficient. Of the three case studies TIS is the only scheme where the farmers have not marketed any of their crops through the formal market for the duration of the project. All vegetables are sold to members of the communities surrounding the scheme, or to hawkers. The stringent quality requirements and other stumbling blocks associated with the formal market thus may have effectively excluded the farmers from participating in the formal market. The farmers thus have little incentive to comply with any of the rules that govern the activities on the scheme. Since the farmers do not comply with the institutions of the WUA they do not really have secure access to irrigation water. It is noted that one of the major cultural conflicts relate to non-compliance with the institutions related to water use. The group of farmers downstream believe that the farmers upstream do not comply with the irrigation schedule. Given the perception of opportunistic behaviour by the different groups, farmers from both groups fail to comply with the institutions on the scheme.

The effect of non-compliance with the institutions is that there is little order in the operations on the scheme, and consequently poor performance by the farmers. The three case studies thus clearly demonstrate the influence of correctly aligned incentives on the ability to guide the behaviour of emerging farmers in order to overcome the stumbling blocks. Based on the analysis of the institutional environment key success factors include secure tenure for individual farmers, financing products that cater for the typical characteristics of emerging farmers, and effective collective action that contribute to the development of the businesses of emerging farmers.

The analyses of the governance structures at the respective case studies led to the conclusion that a high degree of vertical coordination between emerging farmers and their buyers is not necessarily viable despite the ability of vertical coordination to reduce the transaction costs faced by the farmers. A comprehensive analysis of the transaction is necessary to be able to select the best vertical coordination strategy. The viability of a vertically coordinated relationship depends very much on the attributes of the transaction. In both the case of ZIS and TIS it was concluded that no form of vertical coordination would be viable. On the other hand, the conclusion from the case of Eksteenskuil is that those farmers have to increase their current level of vertical coordination (specifications contracting) to an even higher level (strategic alliance). Since it is recognised that a vertically coordinated relationship has some major advantages for emerging farmers (i.e. active support, a certain market for the crops, and reduction in transaction costs) the reasons for recommending a strategic alliance in the case of Eksteenskuil may provide valuable insight into the requirements for viable strategic alliance relationships between emerging farmers and agro-processing companies. The transaction between the farmers from Eksteenskuil and SAD is characterised by the complementary relationship between the farmers and SAD. Neither the farmers nor SAD can access the incentives without the contribution of the other party. Through EAC the farmers from Eksteenskuil also exhibited the required competence of control to be able to manage the vertically coordinated relationship. Higher degrees of vertical coordination require higher degrees of management. Emerging farmers who want to enter into a vertically coordinated relationship should make sure that they have the necessary skills to manage such a relationship. Incentives that will create a complementary relationship between emerging farmers and one of the key role-players (i.e. agro-processing companies) in the value chain may contribute to the viability of a vertically coordinated relationship between such a key role-player and emerging farmers. The farmers will also get access to other advantages (i.e. support) from such a relationship.

The main conclusion from the analyses of the resource allocation at the different study areas is that there is great potential for the farmers from all three schemes to increase their production levels at their current input levels and within their current technology sets. Thus, despite the fact that the farmers are forced to operate in an environment that is considered not to be enabling,

they still should be able to improve their performance. The potential of improving the levels of technical efficiency is also echoed by the results from the cash flow optimisation model that shows that the farmers will benefit substantially if they are supported to produce on the efficiency frontier. Again the need for effective support structures as a key success factor to the successful participation of emerging farmers in commercial agri-food chains is highlighted.

Ultimately one may conclude that the application of the conceptual framework at the three case studies have resulted in identifying potential solutions and key success factors that may contribute to the successful participation of emerging farmers in commercial agri-food chains. The next section contains some recommendations for emerging farmers, policy makers and further research that may contribute towards optimising water use in agricultural value chains and towards integrating emerging farmers into commercial agri-food chains.

7.3 RECOMMENDATIONS

Based on the findings from the three case studies, some recommendations can be made for emerging farmers to enhance their ability to successfully participate in commercial agri-food chains, for policy makers to formulate some new policies and to adjust some of the existing policies to enhance the successful participation of emerging farmers in commercial agri-food chains, and for future research that needs to be conducted to contribute to the topic of the optimisation of economic beneficial water use by the integration of emerging farmers into the main stream of the economy.

7.3.1 RECOMMENDATIONS TO EMERGING FARMERS

- Instead of viewing stumbling blocks (including strict rules and regulations associated with commercial agri-food chains) as a barrier to entry that exclude them from participating in commercial agri-food chains, emerging farmers must actively investigate strategies that will allow them to overcome stumbling blocks. Collective action has a major role to play to enable emerging farmers to overcome a number of the stumbling blocks. Farmers should negotiate and institute rules among themselves that will formalise their actions to improve coordination to allow effective collective action in efforts to overcome stumbling blocks.
- The farmers should strive towards the efficient use of their limited production inputs. Although it is recognised that the farmers do not have access to the recommended levels of the production inputs, the results showed that they can still substantially increase their production by improving the efficiency with which they use their current levels of inputs. Farmers should apply the information that is transferred through training sessions to allow them to benefit from more efficient use of production inputs.
- Farmers should strive towards the timely application of production inputs to ensure that the marginal benefit from the application of the inputs is as high as possible. The late

application of production inputs was identified to have a major negative impact on crop yields. Farmers should make sure that they not only know the recommended input levels, but also the recommended time of application to ensure that they get optimal benefit from using the inputs.

- Farmers should endeavour to improve their skills that are required in the day-to-day decisions making activities on their farms. Farmer-to-farmer skills transfer has major scope in this regard. Emphasis on farmer-to-farmer skills transfers will also contribute to increasing the levels of social capital of the farmers. Given the crucial role of collective action in the successful participation of emerging farmers in commercial agri-food chains, farmers stand to benefit substantially from endeavours to increase farmer-to-farmer skills transfer.
- In order to ensure that farmers receive the maximum benefit from the time they spend attending training sessions the management committees of the collective entities of emerging farmers have to regularly conduct needs assessments to identify aspects/activities the farmers want/need training in. Such assessments will ensure that training sessions that are organised are relevant to capacitate the farmers to make decisions that will benefit their farm businesses.
- Farmers should strive towards buying the necessary production inputs soon after harvest before spending the revenue on non-farming items. The early buying of production inputs may enable the farmers to apply the recommended levels of production inputs in a timely manner. The results from the cash flow optimisation model showed that there is major scope to improve the cash flow position of the farmers (a major stumbling block) if the farmers were to intensify their production processes.
- Emerging farmers should focus on ways to decrease the transaction costs faced by their buyers when dealing with emerging farmers. Buyers prove to be willing to deal with emerging farmers as long as it does not negatively impact their brands. Buyers require consistent supply of good quality produce, whether they procure from emerging or commercial farmers. Higher degrees of coordination among emerging farmers may contribute to a more consistent supply of fresh produce. Vegetable farmers should also grade their vegetables after harvest to differentiate between good quality vegetables and vegetables of a lesser quality. Only good quality vegetables should be sent to retail stores in order to start developing a brand of good quality vegetables at the respective retail stores. Such a strategy will contribute to a more consistent supply of good quality vegetables, and hence a reduction in some of the major transaction costs faced by the buyers when dealing with emerging farmers.
- Emerging farmers should guard against selling loads of vegetables of mixed quality to buyers who are also willing to buy vegetables of lesser quality (i.e. fresh produce markets). By selling good quality vegetables separate from vegetables of lesser quality will prevent the buyers to offer lower prices for the whole load due to the poor quality vegetables that are included in the load. By grading the vegetables before sending it to the buyers the

farmers will ensure that good quality vegetables are sold together, and vegetables of lesser quality are sold together.

- Farmers should guard against the negative impact of cultural activities on the performance of their farm businesses. Farmers who want to participate in cultural activities must ensure that the necessary activities on their farms are still performed. The biological nature of agricultural production suggests that the timing of certain activities is crucial. Farmers thus should be careful not to participate in cultural activities at the expense of their farm businesses.
- The nature of the constraints that typically exclude emerging farmers from participating in commercial agri-food chains suggests that farmers should keep an open mind with regard to the prospects of part-time farming as a mode of transition into commercial agriculture. Part-time farming exposes the farmer to additional human capital development activities, and decreases the dependence on farm profits for survival. Part-time farmers thus are more able to reinvest their profits in their farm businesses to grow their businesses.

7.3.2 POLICY RECOMMENDATIONS

The policy recommendations are discussed in two sections. The first section is concerned with policy recommendations to optimise water use along value chains, while the second section is more concerned with policies that will facilitate the successful participation of emerging farmers in commercial agri-food chains.

7.3.2.1 Policy recommendation related to water use in food value chains

- Policies that aim to facilitate compliance with the National Water Act (1998) have to be enforced to ensure that the farmers do comply. Ultimately, water resources need to be protected. Rather than supporting emerging farmers by not enforcing such policies, the focus rather should be to support the farmers to improve their performance to enable them to comply with such policies.
- Policies are required to incentivise all agents along a value chain to measure their water use as a first step towards increasing the degree of efficiency with which water is used along the chain. Price incentives for products that contain its water footprint on its label will incentivise the different role-players to ensure that water is measured at all of the different stages along the value chain.
- As the next step towards ensuring the efficient use of water, policies are required to incentivise all role-players to meet sub-sector water footprint benchmarks to ensure that water is used efficiently along the value chains. If incentives are correctly aligned, lead firms in value chains may contribute substantially towards ensuring the efficient use of water along the chain. Care should be taken to ensure that incentives are distributed fairly throughout the whole value chain to allow all agents to benefit from compliance. It has to

be noted, however, that such an incentive may create a new stumbling block for emerging farmers who are known to be relatively inefficient. Buyers in commercial agri-food chains may be reluctant to deal with inefficient producers in order to access the incentive.

- Policies that will contribute to uplifting emerging farmers will also contribute substantially towards optimising the water that was used in value chains within which the emerging farmers participate by creating incentives for emerging farmers to use water more efficiently.

7.3.2.2 Policy recommendation related to uplifting emerging farmers

- Policies are required to facilitate government to meet its responsibility to provide emerging farmers with an enabling environment. A number of the stumbling blocks that contribute to the exclusion of emerging farmers from participating in commercial agri-food chains relate to the absence of an enabling environment. The recommendation that government needs to meet its responsibility to provide emerging farmers with an enabling environment is also echoed in current policy documents of government. Through CRDP (2009) government pledges, amongst others, to improve road infrastructure and transport networks. NDP (2011) also recommends a substantial increase in investment in water resource and irrigation infrastructure. Although government proves to recognise its role as is evident from its strategic plans (NDP, 2011; CRDP, 2009) compliance to the pledge proves to be too slow. The performance criteria of the relevant governmental departments need to be adjusted to put more emphasis on meeting the commitments. Sanctions for failure to meet the commitments need to be clearly specified and strictly enforced.
- Policies are required to facilitate the transfer of secure tenure to emerging farmers who operate on communal land. Secure tenure contributes to an enabling environment and also proves to contribute to farmers using their inputs more efficiently. Government already recognises the need for transferring secure tenure as is evident from NDP (2011) that emphasises the need to, and CRDP (2009) that pledges to transfer secure tenure to emerging farmers. New policies and legislation are required to replace CLARA (CLARA was declared invalid in its entirety in 2011 by the Constitutional Court of South Africa) to speed up the process of transferring secure tenure to emerging farmers. Again, the performance criteria of the relevant governmental departments need to be adjusted to put more emphasis on the successful transfer of secure tenure to emerging farmers. Incentives for success and sanctions for failure need to be clearly specified and strictly enforced.
- Policies are required that incentivise commercial credit providers to develop financing products that are tailor made for emerging farmers. The very nature of being an emerging farmer normally excludes emerging farmers from having access to commercial credit. Access to credit will allow emerging farmers to supplement their cash flow, and hence to overcome a major stumbling block that contributes to the exclusion of emerging farmers from the formal market. Government also realise the need for tailor made financing

products as is evident from the Mafisa financing scheme through CRDP (2009) to provide emerging farmers with access to credit.

- Given the nature of emerging farmers in South Africa collective action has great potential to allow emerging farmers to benefit from economies of scale, and to reduce transaction costs faced by buyers who deal with emerging farmers. Policies are required to incentivise the establishment of collective entities among emerging farmers. The incentives, however, should not force farmers to establish an agricultural co-operative per se, but rather to establish an appropriate collective entity as a vehicle that will allow them to gain access to incentives through increased production of good quality produce. The recommendation of incentivising collective action corroborates with the objectives of government to establish more co-operatives. NDP (2011) promotes the formation of agricultural co-operatives for emerging farmers to allow the farmers to benefit from economies of scale. DTI also places a lot of emphasis on the formation of agricultural co-operatives as is evident from the fact that they plan to increase funds for the Co-operative Incentive Scheme (South African LED Network, 2012). Implementing appropriate incentives as recommended by this study thus may help government to meet its objective to get more farmers organised in collective entities (not necessarily co-operatives).
- Relationships between emerging farmers and lead firms in agri- food chains (i.e. agro-processing companies) have great potential to facilitate the necessary support that emerging farmers lack to overcome the stringent requirements that typically exclude them from the formal market. Inconsistent volumes and poor quality of produce from emerging farmers, however, cause lead firms generally to be reluctant to enter into formal relationships with emerging farmers. Policies are required to incentivise such lead firms to enter into vertically coordinated relationships with emerging farmers. Incentives may include, i.e. tax benefits to organisations that can prove that they support and deal with emerging farmers thereby creating a complementary relationship between such organisations and the farmers. Again, the recommendation corroborates current thinking by government as is evident from NDP (2011) which recommends the identification of potential partners in agro-processing value chains to support smallholder development and promoting preferred procurement mechanisms, and CRDP (2010) that has a strategy to form strategic partnerships between emerging farmers and key role-players in value chains. The results from this study, however, show that a strategic alliance will not necessarily be the optimal type of relationship. Government policies should not strictly recommend a specific type of relationship, but rather an appropriate type of relationship that will optimally benefit both parties. Once the appropriate type of relationship has been identified and instituted, the farmers are likely to also benefit from increased access to the necessary support and strategic market information as spin-offs from the relationship. The spin-offs again relate to further recommendations by NDP (2011) to improve the distribution of strategic market information to emerging farmers, and to improve and extend skills development and training in agriculture.

- Policies (i.e. price incentives) that incentivise emerging farmers to increase the production of good quality produce will also incentivise the farmers to improve the levels of efficiency with which they currently use their production inputs. It is, however, recognised that such incentives will mainly attract the attention of those farmers that exhibit relatively high levels of entrepreneurial skills. CRDP (2009) also emphasises increased production through the optimal allocation of resources. Support and training are crucial to help farmers increasing their technical efficiency levels. By creating a complementary relationship between emerging farmers and key role-players in their value chains the necessary support can be provided by private sector companies instead of governmental extension officers. Government then can focus its attention on creating and maintaining an enabling environment for the farmers.
- Policies are required to stimulate research and development in types of technology that will allow emerging farmers to also benefit from investments in research and development. The very nature of being emerging farmers (i.e. low levels of financial and human capital) means that emerging farmers typically do not exhibit the necessary means to adopt sophisticated new technology. The current recommendation of NDP (2011) to focus the attention of research and development on sophisticated new technology thus will mean that emerging farmers are excluded from benefiting from such investments. While it is recognised that there is scope for research and development to focus on new technology, the focus of attention should be broader to allow emerging farmers to also benefit from investments in research and development.
- Policies are required to facilitate more effective extension and education. Extension and training are crucial to capacitate emerging farmers to increase the levels of efficiency with which they use their production inputs to produce agricultural products. Training sessions, however, have to specifically address challenges faced by the farmers in their day-to-day decision-making activities. Incentives and sanctions associated with the performance of extension officers and trainers should be clearly specified and enforced.
- Policies are required to incentivise part-time farming as a mode of transition from subsistence to emerging farming, and from emerging to commercial farming. Potential advantages of part-time farming include, amongst others, the fact that employees normally receive training that contributes to the expansion of their human capital; and part-time farming will also allow the farmer to reinvest profits into the farm business in order to enhance growth.
- The exit level strategy of any project that aims to support emerging farmers to improve their competitiveness to be able to participate sustainably in commercial agri-food chains has to be clearly specified and enforced to ensure that the farmers will be able to succeed on their own after the completion of the project.
- Government should refrain from dishing out production inputs to emerging farmers since it creates a culture of dependence. Instead, policies that allow emerging farmers to receive

a price premium for good quality produce will incentivise the farmers to put in substantial effort to produce large volumes of good quality produce.

- Lastly, since the recommended policies relate to different governmental departments, it is recommended that there should be a high degree of coordination between the different governmental departments when implementing the respective policies that aim to facilitate the integration of emerging farmers into commercial agri-food chains. The nature of the stumbling blocks suggests that the successful participation of emerging farmers in commercial agri-food chains depends on all of the stumbling blocks being overcome simultaneously. Uncoordinated implementation of the different policies may mean that the farmers are unable to benefit optimally from the recommended policy changes.

7.3.3 RECOMMENDATIONS FOR FURTHER RESEARCH

The recommendations for further research is again divided into recommendations to optimise water use in value chains, and recommendations for further research to facilitate the linkage between emerging farmers and commercial agri-food chains.

7.3.3.1 Recommendation for further research related to water use in food value chains

- Research is necessary to determine benchmarks for sub-sector water footprints that can be used as a measure for success to incentivise role-players within agri-food chains to use water more efficiently. Benchmarks have to be identified for process water footprints at each stage along the value chain to ensure that role-players within each stage actively contribute towards the efficient use of water along the whole value chain.
- The reluctance of farmers (both emerging and commercial) to measure their water use in order to increase the level of efficiency with which they use water may be an indication of the failure of the institutions related to water use. Further research is necessary to determine the reasons for the failure of those institutions.
- For the purpose of this study the focus was to optimise the use of blue water along the value chains within which the emerging farmers from the respective case studies participate. Further research is necessary to optimise all types of water (green, blue and grey) that was used along the value chain. Optimal use of green water will decrease the need for blue water to produce the product. Similarly, minimising the degree of pollution along the value chain will minimise the need for fresh water that is needed to dilute the pollutants to acceptable levels (grey water). Since green and grey water affect the amount of blue water required, it is important to consider all types of water to really optimise water use along value chains.
- Given that the bulk of the water is used at farm-level, further research is necessary to increase the level of efficiency with which irrigation water is used at farm level. Care should

be taken to ensure that technological advances are not for exclusive access to commercial farmers as is often the case with new technology. Emerging farmers too use substantial amounts of water while generating very poor returns from the water that is used. Consequently, the allocation of irrigation water to emerging farmers currently proves to be an inefficient allocation of the scarce water. Since it is recognised that irrigation farming has great potential to contribute to rural development, increasing the efficiency with which emerging farmers use irrigation water thus too deserves special attention in research. Further research is necessary to develop the appropriate technology that will allow emerging farmers to use water more efficiently.

7.3.3.3 Recommendation for further research related to uplifting emerging farmers

- The focus of attention of this study was to investigate key success factors that will contribute to the successful participation of emerging farmers in existing agri-food chains based on the assumption that the existing value chains are already competitive. Further research is necessary to investigate the potential to increase the degree of competitiveness of the respective value chains. Further research is also necessary to investigate different sub-sectors to identify those sub-sectors with good prospects for the successful integration of emerging farmers.
- Given that the bulk of the value is added in the secondary processing node while little of that value is distributed to the farmers, further research is necessary to investigate the scope for the farmers from Eksteenskuil to outsource the primary processing activity (which was proven not to be viable for farmers to integrate into) and then to vertically integrate into the secondary processing of raisins where raisins are used as ingredient in the baking industry.
- Further research is necessary to investigate the potential for emerging farmers to gain a sustainable competitive advantage in the commercial agri-food chains within which they are participating. Appropriate instruments need to be developed to give emerging farmers a competitive advantage when participating in commercial agri-food chains.
- Given the potential role to be played by leading firms in a value chain to support emerging farmers, further research is necessary to investigate the incentives and conditions that are required to convince such leading firms to get involved with groups of emerging farmers.
- Research is needed to assess the prospects of transforming communal tenure to individual tenure. The importance of the lack of title deeds as a central cause for the inability of the farmers to produce high volumes of good quality crops makes such research crucial at this stage.
- Research is also needed to assess the impact of the social dynamics of communal tenure and the way people organise themselves on the communal land on the prospects for transition from subsistence farming to emerging and commercial farming.

- The modelling of the optimal cash flow of the farmers in this study was based on the assumption that the farmers' sole objective is to maximise profit. By implication it was assumed that the farmers would use any gains in cash flow to increase production in order to increase their profits. Such an assumption is not necessarily justified. More research is necessary to better understand the decision making behaviour of emerging farmers. Agent Based Modelling may have some potential in this regard.
- Further research is also necessary to establish a development path that may facilitate the transition from communal farming to individual farming that will contribute to the emerging farmers sustainably participating in commercial agri-food chains. In this regard it is important to consider the different emerging farmer typologies to identify those typologies that likely will be able to successfully move along a development path towards commercial farming.
- The potential of transitioning from communal farmers to individual farmers through the establishment of efficient land rental markets for emerging farmers also needs to be investigated. Given the challenge associated with the transfer of title deeds to individual farmers there may be scope for a rental market to secure tenure for individual farmers in the transition period. The rental market may even be sufficiently viable to decrease the need for transferring the title to all individual farmers.
- The role of part-time farming in the transition from communal farming to individual farming also needs to be investigated. Part-time farming may put less pressure on profit margins since the livelihoods of part-time farmers are not completely dependent on the income generated from their farm activities. Part-time farmers thus may be able to reinvest a larger proportion of their profits into their farms.
- A common occurrence within rural communities is the fact that the more dynamic members of the community leave the rural areas with the prospects to improve their livelihoods in the urban regions. Community members are also often reluctant to allow outsiders to enter their communities as new land users. Further research is necessary to investigate the impact of such social dynamics on land use in rural areas.
- Lastly, the developed net cash flow optimisation model needs to be extended to allow for proper modelling of the net cash flow of perennial crops over their entire lifespan.

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APPENDIX A

PROCEDURES FOR PRINCIPLE COMPONENT REGRESSION

1 Principal Component Regression

Multi-collinearity problems can be resolved by various techniques. O'Brien (2007) suggests three remedies for reducing collinearity, namely, (i) Re-specification of the model used, (ii) Elimination of or combining highly correlated independent variables; and (iii) the Ridge regression technique. In addition to these, Ranjit (2006) suggests principal component regression (PCR), which is based on principal component analysis (PCA), as a method that combats multi-collinearity. Some researchers have used the PCA to combat multi-collinearity. The problem is that they interpret principal components (PC), which are sometimes difficult to interpret because variables that do not make sense are sometimes grouped in a single component.

A PCR is a technique that combines linear regression and PCA (Pires *et al.,* 2008). The PCR further creates a correlation between the dependent variable (y) and the chosen PC of the independent variables (x_i). Adnan *et al.* (2006) indicate that the PCR resolves multi-collinearity by removing model inconsistency and decreases the variances of regression coefficients. However, the PCR procedure employed in this study is adopted from Magingxa (2006). Moreover, the methodology differs slightly from Magingxa in that the PCR is in a Tobit framework instead of a Logit framework. The following subsections explicitly outline the PCR procedure implemented.

1.1 Transforming Variables to Standard Form

The initial stage to conduct a PCR was carried out by transforming original independent variables into standard form. The independent variables were standardised in the form:

$$x_i^s = (x_i - \bar{x}_i)/s_{x_i} \qquad (9)$$

Where x_i^s is the standardised independent variable under consideration, x_i is the i^{th} explanatory variable, $\bar{x}_i$ is the mean of the independent variable concerned, and s_{x_i} represents the standard deviation of the i^{th} independent variable. The standardisation of independent variables is performed in order to obtain uncorrelated PC scores which will be computed later. Since the methodology is conducted in a Tobit framework, the dependent variable y is not transformed to a standardised dependent variable y^s because the Tobit only takes censored variables $[0;1]$.

1.2 Variable Selection in Principal Component Analysis

The subsequent step of the PCR is to compute and select eigen-vectors that will be included in the regression. The criterion to select eigen-vectors is based on eigen-values greater than 1.00, a method referred to as the "Kaiser-Gutman Rule" (Fekedulegn *et al*., 2002). According to Liu *et al.* (2003), eigen-values provide evidence to the number of distinct proportions that are available among independent variables. When several eigen-values are found to be close to zero, there is enough evidence to acknowledge that the variables are inter-correlated (Liu *et al.,* 2003) and eigen-vectors corresponding to eigen-values below 1.00 are eliminated from the analysis.

The eigen-values and eigen-vectors were computed from original independent variables. After running the PCA procedure on the NCSS programme, the eigen-values and equivalent eigen-vectors v_j were obtained in equation 10 and 11 respectively.

$$\left|C-\lambda I\right|=0,\left|C-\lambda_j I\right|v_j=0 \qquad (10)$$

The eigen-values were computed in sequence of largest to smallest, $\lambda_1,\lambda_2,.....,\lambda_k$. Further, the eigen-vectors were organised to provide the matrix in equation 11 below.

$$V=\begin{bmatrix} v_{11} & v_{12} & . & . & . & v_{1k} \\ v_{21} & v_{22} & . & . & . & v_{2k} \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ v_{k1} & v_{k2} & . & . & . & v_{kk} \end{bmatrix} \qquad (11)$$

The matrix *V* is acknowledged to be orthonormal as its columns acts in accordance with the conditions $v_i' v_i = 1$ and $v_j' v_i = 0$ for $i \neq j$.

1.3 Principal Components in Regression Analysis

It should be recalled that the method employed to solve multi-collinearity problems and simultaneously estimate efficiency variables in production stages is a PCR within a Tobit framework. However, before the Tobit regression is carried out, principal components scores *Z* are manually calculated with equation 12 below:

$$Z = X^s V \tag{12}$$

Where X^s is the standardised n x k matrix of standardised variables initially calculated in equation 9, *V* is eigen-vector matrix as clarified by equation 11. The component scores *Z* are calculated in a matrices multiplication product form with a dimension of k components equal to k variables. Recalling equation 4, the estimation of the components is regressed against the original dependent variable θ^k (which is equal to y) with which equation 4 is reformulated into equation 13 below:

$$y = \beta_0^s + X^s V \beta^s + \varepsilon \tag{13}$$

Where β_0^s and β^s are estimated by the Tobit regression model, and are standardised coefficients of the constant and the independent parameters respectively. Therefore for the production stage, seven component scores were added to the Tobit regression for estimation as defined by equation 13.

As highlighted by Magingxa (2006), Adnan *et al.* (2006) and Fekedulegn *et al.* (2002) agree that the new set of variables (component scores) are orthogonal, meaning they are uncorrelated, because the eigen-vectors are orthogonal to one another as defined by the eigen-vector matrix V when $VV' = I$. However, recall the model formulation specified in equation 4 and since $VV' = I$, then according to Fekedulegn *et al.* (2002), the original equation 4, or to be more precise equation 13, can be reformulated in the form:

$$y = \beta_0^s + X^s VV' \beta^s + \varepsilon \tag{14}$$

or

$$y = \beta_o^s + Z\rho + \varepsilon \tag{15}$$

Where $X^s V = Z$ and $V'\beta^s = \rho$. As described by Magingxa (2006), Z is the $n\,x\,l$ matrix of retained components, V is a $k\,x\,l$ matrix of eigen-vectors equivalent to the l retained components, and X^s the standardised dependent variables. ρ is $l\,x\,l$ vector of new coefficients associated with l components. Magingxa (2006) and Fekedulegn *et al.* (2002) describe standard errors of the estimated coefficients ρ as symbolised by a $l\,x\,1$ vector computed in the form

$$Var(\hat{\rho}) = \hat{\delta}^2 (Z'Z)^{-1} = \hat{\delta} diag(\lambda_1^{-1}, \lambda_2^{-1}, ... \lambda_l^{-1}) \qquad (16)$$

Where $\hat{\delta}^2$ is variance of residuals from equation 14. The elimination of components is carried out in accordance with the procedure proposed by Fekedulegn *et al.* (2002), who highlight that even if the new variables are orthogonal, the magnitude of variance does not change. However, the elimination of one or more components will eventually reduce the total variance in the prediction model and consequently result in a consistently better prediction model (Draper and Smith, 1981; Myers, 1986). The elimination of the components can best be done based on their significance (Magingxa, 2006). Presume that r principal components are eliminated, which means that equation 15 will now be reformulated to use $k - r$ components. Therefore, the reduced model with the r eliminated components can be written in the form

$$y = \beta_0^s + Z_{k-r}\rho_{k-r} + \varepsilon^0 \qquad (17)$$

The *o* symbol on ε^0 is used to differentiate it from ε in equation 15, since they are not identical (Fekedulegn *et al.,* 2002). According to Fekedulegn *et al.* (2002), the estimated values and residuals generated by equations 14 or 15 are similar to those generated in equation 13.

1.4 Estimation of Explanatory Variables with Components

The advantage of a PCR is that all hypothesised independent variables can be manually computed. Therefore, the retained components are extracted from equation 13, which ultimately forms equation 17, and the components are eventually used for further analysis. Thus the retained components are transformed back into original independent standardised variables in the following manner:

$$b_{pc}^{s} = V_{k-r}\hat{\rho}_{k-r}$$

$$\begin{bmatrix} b_{1,pc}^{s} \\ b_{2,pc}^{s} \\ . \\ . \\ . \\ b_{k,pc}^{s} \end{bmatrix} = \begin{bmatrix} v_{11} & v_{1l} & . & . & . & . & v_{1l} \\ v_{21} & v_{22} & . & . & . & . & v_{2l} \\ . & . & . & . & . & . & . \\ . & . & . & . & . & . & . \\ . & . & . & . & . & . & . \\ v_{k1} & v_{k2} & . & . & . & . & v_{kl} \end{bmatrix} * \begin{bmatrix} \hat{\rho}_{1} \\ \hat{\rho}_{2} \\ . \\ . \\ . \\ \hat{\rho}_{l} \end{bmatrix} \qquad (18)$$

Where the matrix of eigen-vectors aligned with the retained principal components is V_{k-r}, while $\hat{\rho}_{k-r}$ is a vector of estimated coefficients (apart from the intercept) in the model of equation 17, and b_{pc}^{s} is a vector of estimated coefficients (apart from the intercept) of the parameters in vector β^{s} in equation 13. Further, aligned with Magingxa (2006) and Fekedulegn *et al.* (2002), variance of the principal component estimators in the form of standardised variables is computed by:

$$Var(b_{pc}^{s}) = \upsilon_{l}^{s} K^{S} \qquad (17)$$

Where υ_{l}^{s} indicates the squares of the eigen-vector elements of V_{l}^{s} in equation 11, and K^{S} indicates the squares of the elements of the matrix of standard errors of the coefficient matrix ρ in equation 17. The equivalent standard errors for the estimators of principal components of standardised variables are specified by:

$$s.e.(b_{pc}^{s}) = Var(b_{pc}^{s})]^{\frac{1}{2}} \qquad (19)$$

In line with Fekedulegn *et al.* (2002) and Magingxa (2006), standardised variables b_{pc}^{s} of standardised variables X_{j}^{x} can further be converted to natural un-standardised variables $b_{j,pc}$ of X_{j}. The results of the above procedure are given by:

$$b_{j,pc} = \frac{b_{j,pc}^{s}}{1/S_{xj}}, \qquad j = 1,2,.....,k \qquad (20)$$

and

$$b_{0,pc} = b^{s}_{o,pc} - \frac{b^{s}_{1,pc}\bar{x}_1}{S_{x1}} - \frac{b^{s}_{2,pc}\bar{x}_2}{S_{x2}} - \ldots\ldots\ldots\ldots - \frac{b^{s}_{k,pc}\bar{x}_k}{S_{xk}} \qquad (21)$$

Where s_{xj} is the standard deviation of the j^{th} original variable X_j and $b^{s}_{o,pc}, b^{s}_{1,pc}, b^{s}_{2,pc}, \ldots, b^{s}_{k,pc}$ are coefficients of the standardised variables. Since the original un-standardised dependent variable (efficiency score) is used in the Tobit model when estimating principal components significance, it follows that the natural un-standardised variables $b_{j,pc}$ can be correctly calculated when the standard deviation s_{xj} is computed by $1/S_{xj}$ as shown in equation 20.

APPENDIX B

QUESTIONNAIRE FOR THE CASE OF EKSTEENSKUIL

Faculty of Natural & Agricultural Sciences

DEPARTMENT AGRICULTURAL ECONOMICS
UNIVERSITY OF THE FREE STATE

QUESTIONNAIRE: 2009

TO BE COMPLETED BY THE RESEARCHER ON BEHALF OF THE PRINCIPAL DECISION MAKER ON THE FARM. INFORMATION WILL BE STRICTLY CONFIDENTIAL

Respondent number _____	Date of interview _____
Interviewer number _	

1 Socio economic questions

1.1	Age	_	years
1.2	Years of formal education (Matric = 12 years)?	_	years
1.3	Years in farming	_	years
1.4	How far is your farm from the market?	_	km

1.5 If farmer is from Eksteenskuil, on which island is the farm?

North Island	1
Middle Island	2
South Island	3

1.6 Please indicate the proportion of your **total** income (farm + off-farm) coming from the following activities:

Income generating activities	**%**
Off-farm economic activities	
Raisin production	
Wine/juice production	
Table grapes	
Crop rotation	
Livestock	
Other	
	100%

2 Land ownership and tenure

2.1 Which of the following best describes your form of land ownership or tenure?

1	I own my land and have title deeds or a land letter from government
2	I own my land and lease **additional** land from another farmer
3	I lease my land from another farmer who does have title deeds
4	I lease my land from government waiting for the transfer of title deeds to me
5	Other (please specify) _____

If 4, would you be willing to sell or lease all or part of your land once you receive the title deeds?

	Yes	**No**
Sell	1	0
Lease	1	0

2.2 Would you like to expand the size of the land you are currently cultivating?

Yes	**No**
1	0

3 Production activities

3.1 Please complete the following table with regard to the size of your farm (own + lease) and the scale of your **raisin** production activities.

	Total farm size (ha)	Total area used for raisin production (ha)		Area harvested (ha)	
		Sultana	Merbein	Sultana	Merbein
2008/9					

3.2 **As at 2008/9**, what size (in ha) of your total established vineyards is:

Between 0 and 4 years old? _____
Between 5 and 10 years old? _____
Between 11 and 24 years old? _____
Older than 25 years? _____

3.3 Please complete the following table with regard to production during the previous seasons.

		Volume delivered (kg)	Choice grade		Standard grade		Industrial grade	
			%	Price (R/kg)	%	Price (R/kg)	%	Price (R/kg)
2008/9	Thompson							
	Golden							
	OR							

3.4 Please indicate which of the following extraordinary activities took place during the past seasons that negatively affected your yield.

Season	**None**	**Hail**	**Extreme cold at blooming stage**	**Other**
2008/9	0	1	**2**	3

3.5 Please indicate which of the following actors in the value chain normally provide you with advice and/or assistance with regard to raisin production

Actor	No	Yes	Organisation
Input suppliers	0	1	
Buyers	0	1	
Government	0	1	
Other farmers	0	1	
Cooperative	0	1	
Research institutes	0	1	
Private consultants	0	1	

- If you have received assistance/training, please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

Statement	Strongly disagree		Neutral		Strongly agree
I attend **all** of the training sessions that are held in the region.	1	2	3	4	5
I **fully** understand the advice and/or training I receive from the above organisations.	1	2	3	4	5
I implement **all** the advice I receive from the above organisations	1	2	3	4	5

3.6 Please indicate what type of irrigation technology you use for **raisin** production.

Flood irrigation	1
Drip irrigation	2
Other	3

3.7 Please indicate whether you use manual or mechanic labour when performing the following activities.

Activity	Manual	Mechanic	
		I borrow/lease the implement	I own the implement
Weeding	0	1	2
Applying pesticide	0	1	2
Pruning/Harvesting	0	1	2

3.8 Do you have access to the following sources of credit?

	YES	NO
Formal (Formal lending institutions)	1	0
Informal (i.e. Family and friends)	1	0

If **NO**, please indicate the level to which the following factors prevent you from having access to credit.

Factor preventing access to credit	Not at all				Main reason
I do not have title deeds of my land and thus I do not have the required collateral	1	2	3	4	5
I do not have a credit record at credit providers	1	2	3	4	5
I do not have family members with sufficient surplus money to fund me	1	2	3	4	5
Other	1	2	3	4	5

3.9 Please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

Statement	**Strongly disagree**		**Neutral**		**Strongly agree**
In general the road network in the region is of a good quality	1	2	3	4	5
In general the water distribution network is in a good condition	1	2	3	4	5
In general the infrastructure at the input suppliers is of good quality	1	2	3	4	5
In general the infrastructure at the market is of good quality	1	2	3	4	5
In general water quality constrains my performance	1	2	3	4	5

3.10 Please indicate the amount of the respective inputs you've used for your 2008/9 **raisin** crop and how much you spent on the respective inputs.

Items		Amount **(per ha)**	Amount **(total)**	Amount spent
Fertiliser (granular) (specify NPK +concentration)		kg	kg	R
Fertiliser ((liquid) (Specify NPK + conc.))		l	l	R
Kraal manure (specify type & unit)				R
Semi-organic fertiliser (specify NPK +conc.)		kg	kg	R
Pesticide		l	l	R
Water (Sultana)		irr	irr	R
Water (Merbein)		irr	irr	
Labour: Full time		#	#	R
		days	days	
Labour: Seasonal	Pruning		#	R
			days	
	Harvesting		#	R
			days	
Number of family members providing family labour for the production of raisins (older than 15 years)		#	#	R
		days	days	
Fuel (used specifically for raisin production)		l	l	R
Leaf feed		kg	kg	R
Number of times you weed (manual/mechanic/ chemical) per year		#	#	R

3.11 What was your total cost (variable +fixed) for raisin production during the 2008/9 season? R

3.12 In your opinion, did you apply a sufficient amount of inputs to obtain an optimal yield?

Yes	No

If **NO**, please indicate the level to which the following factors prevent you from applying a sufficient amount of input.

Reasons	**Not at all**				**Main reason**
Input costs are too high	1	2	3	4	5
I don't have sufficient cash flow by the time I need to apply the inputs	1	2	3	4	5

3.13 On a scale from 1 - 5 please indicate the level to which you agree with the following statement (1 = not at all; 5 = 100%)

Statement	**Not at all**				**100%**
During the past year my farm workers visited the doctor **much more** compared to previous years	1	2	3	4	5

4 Marketing behaviour

The following questions relate to the marketing of **raisins**

4.1 Which marketing channel best describes the channel within which you participate?

Farmer — Processor — Retail — Consumer	1
Farmer — Transporter (middle man) — Processor — Retail — Consumer	2
Farmer — Processor — **Fairtrade** — Retail — Consumer	3

4.2 Which of the following statements best describes the fairtrade initiative (choose only one of the available alternatives)?

Everybody gets treated equally and in a fair manner	1
Previously marginalised producers get a better price	2
Emerging farmers get the same price and treatment as commercial farmers	3

4.3 Please indicate the level to which the following reasons influence your decision to participate in the specific channel as mentioned in 4.1?

Reasons	**Not at all**				**Main reason**
I obtain higher prices	1	2	3	4	5
I incur lower marketing costs	1	2	3	4	5
I obtain more market information	1	2	3	4	5
It is more convenient than other alternatives	1	2	3	4	5
It is the only available marketing channel that I can use	1	2	3	4	5
The specific channel is less risky than the other	1	2	3	4	5
Other (Specify)	1	2	3	4	5

4.4 Please indicate which of the following best describes the way you deliver your raisins to your buyer, and the cost of transporting raisins.

Means of transporting raisins to buyer	
I transport my raisins to the buyer with my own truck	1
I pay someone else to transport my raisins to the buyer	2

The buyer comes to my farm to collect my raisins	3

4.5 What proportion of your total raisin crop did you sell to the following buyer(s). State only the percentage at the specific buyer to which you've sold.

Carpediem	Fruits du Sud	Kalahari Raisins	Redsun raisins	SAD	TRC	Other (Specify):			
									100%

If you sold your raisins to SAD, did you participate in the risk sharing scheme?

Yes	No
1	0

4.6 Please indicate on a scale from 1-5 the level to which you are able to influence the price you receive for your raisins through negotiation (1=not at all; 5=100%)

Not at all				100%
1	2	3	4	5

4.7 Please indicate the level to which the following reasons influence your decision to sell your raisins to the specific processor

Reasons	**Not at all**				**Main reason**
I obtain higher prices	1	2	3	4	5
I have a long term relationship with the specific processor so I feel loyal towards them	1	2	3	4	5
I obtain more market information from the specific processor compared to other	1	2	3	4	5
They come and collect my raisins from my farm	1	2	3	4	5
I can negotiate with the specific processor for a better price for my raisins	1	2	3	4	5
Other (Specify)	1	2	3	4	5

4.8 Do you have a preferred processor to which to like to sell your raisins?

Yes	No
1	0

If YES, please indicate the level to which the following reasons will convince you to sell your raisins to another processor.

Reasons	**Not at all**				**Main reason**
If the price of the other processor is higher than the current price I can receive	1	2	3	4	5
If the other processor provides more information/assistance/training	1	2	3	4	5
If the other processor is willing to collect my raisins from my farm	1	2	3	4	5
If the trust relationship between my preferred processor and myself is compromised	1	2	3	4	5
If the other processor is willing to negotiate for a better price for my raisins	1	2	3	4	5

	If the other processor will grade my raisins a larger percentage choice grade	1	2	3	4	5
	Other (Specify)	1	2	3	4	5

4.9 In your opinion, which of the processing companies has got the most power in the market?

Carpediem	Fruits du Sud	Kalahari Raisins	Redsun raisins	SAD	TRC
1	2	3	4	5	6

4.10 Where do you get your price information?

Other farmers	1
Buyers (via sms/telephone call)	2
Buyers (you visit them for price information)	3
Other: _____	4

4.11 How many buyers do you consult before you sell your raisins?

1	2	3	4	5	>5

How long did it take you to determine which buyer to sell to?

<1h	1-2h	2-3h	>3h

How many transactions do you engage with buyers (i.e. How many loads do you deliver)?

<3	4-6	7-9	10-12	13-15	>15

4.12 Which of the following best describes your relationship with your buyer:

No formal agreement	0
Short term relationship	1
Long term relationship	2

4.13 If you do have a formal agreement with your buyer, do you write down what you agreed upon

Yes	No
1	0

If YES, what are the main specifications of the written agreement?

Price	1
Price and volume	2
Price, volume and quality	3
Price and quality	4
Volume	5
Volume and quality	6

4.14

Please answer **YES** or **NO** to the following questions	**YES**	**NO**
Do you plan to have future transactions with your current buyer?	1	0
Have you ever experienced delayed payment from the buyer?	1	0
Do you receive financial support/credit from the buyer?	1	0
Have you ever had conflicts with the buyer?	1	0
Do you always know current raisin prices?	1	0

	Do you own a vehicle/implements that are **specifically** used for raisins production and/or transporting raisins to the market?	1	0
	Have you invested in storage facilities for raisins?	1	0
	Have you invested in packaging facilities for raisins?	1	0
	Have you invested in processing facilities for raisins (trays, mats)?	1	0
	Do you agree that the buyer withhold important information?	1	0
	Do you sometimes tend to withhold information from buyers?	1	0

- If important information was withheld, it would most likely be about:

Withheld information	**By buyer**	**By You**
prices	1	1
chemicals used	2	2
quality (true reflection of my grade, etc.)	3	3
volumes	4	4
what other farmers are doing / are not doing	5	5
market demand	6	6
other:	7	7

4.15 On a scale from 1 to 5 please indicate the level to which you agree with the following statements

	Not at all				**Agree 100%**
I am willing to co-operate with other farmers to **buy inputs**	1	2	3	4	5
I am willing to co-operate with other farmers to **sell my raisins**	1	2	3	4	5
I am willing to work with other farmers to process raisins in order to **add value** ourselves	1	2	3	4	5

- If scoring 2 or less, please rank the level to which the following factors prevent you from co-operating with other farmers.

Reasons	**Not at all**				**Main reason**
I do not trust the other farmers	1	2	3	4	5
I like to make my own decisions and do things the way I want to do it.	1	2	3	4	5
I am afraid that the quality of the other farmer's produce is poor which will cause my grading to be lower than it should.	1	2	3	4	5
Other (Specify)	1	2	3	4	5

5 Product Control

5.1 **Compared to other farmers in the region** please indicate on a scale from 1-7 the level to which you **use** the following activities to ensure the highest possible **yield .**

Activity	**Not at all**						**Always**
Timely and sufficient irrigation	1	2	3	4	5	6	7
Remove weeds below the vineyards	1	2	3	4	5	6	7
Timely pruning	1	2	3	4	5	6	7
Preventing soil compaction	1	2	3	4	5	6	7
Use same pruning team every year	1	2	3	4	5	6	7
Use same harvesting team every year	1	2	3	4	5	6	7
Use enough fertiliser	1	2	3	4	5	6	7
Use leaf feed	1	2	3	4	5	6	7
Ensure presence of organic ground cover	1	2	3	4	5	6	7

5.2 Please indicate when you have applied fertiliser during the following stages:

After harvest	Did not apply	Feb	Mar	Apr
After blooming	Did not apply	Aug	Sep	Oct
At fruit bearing (met set)	Did not apply	Sep	Oct	Nov

5.3 **Compared to other farmers in the region** please indicate on a scale from 1-7 the level to which you use the following activities to ensure a high proportion of Choice grade raisins.

Activity	**Not at all**						**Always**
Timely irrigation	1	2	3	4	5	6	7
Remove weeds	1	2	3	4	5	6	7
Timely pruning	1	2	3	4	5	6	7
Leaf management for exposure to sunlight	1	2	3	4	5	6	7
Testing maturity of the grape before harvest	1	2	3	4	5	6	7
Wait until the whole block is ready to be harvested before starting to harvest	1	2	3	4	5	6	7
Eliminating damaged/ contaminated grapes	1	2	3	4	5	6	7
You oversee all activities to ensure that harvested grapes are handled with care	1	2	3	4	5	6	7
Cleanliness of drying trays	1	2	3	4	5	6	7
Avoid overstacking when drying	1	2	3	4	5	6	7
Turning over raisins when drying	1	2	3	4	5	6	7

Cover when raining	1	2	3	4	5	6	7
Use same pruning team every year	1	2	3	4	5	6	7
Use same harvesting team every year	1	2	3	4	5	6	7

5.4 Please indicate which of the following methods is the **final** method you use to test whether or not your grapes are ready to be harvested

I squash the grape between my fingers to see whether it is sticky	1
I taste the grapes to determine whether it is sweet enough	2
I take a sample to another farmer who tests the sugar content with a test kit	3
I take a sample to the buyer who tests the sugar content with a test kit	4
I have a test kit to test the sugar content	5

6 Social Capital

6.1 Please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

	Strongly disagree		Neutral		Strongly agree
Optimism and Expectation of equal treatment					
My life will get even better in the future	1	2	3	4	5
Local government treats everyone equally	1	2	3	4	5
I would not be farming if I had an alternative source of income.	1	2	3	4	5
Satisfaction					
I am happy and satisfied with my life	1	2	3	4	5
I am willing to take more risk than other farmers in my community	1	2	3	4	5
I am willing to forgo a profit opportunity in the short run for the ability to benefit from potential profit opportunities in the long run.	1	2	3	4	5
Trust					
Generally speaking, do you agree most people could be trusted	1	2	3	4	5
I can safely say I am trustworthy	1	2	3	4	5
I trust my family	1	2	3	4	5
I trust my friends	1	2	3	4	5
I feel safe in my neighborhood	1	2	3	4	5
I trust the church and its people	1	2	3	4	5
I trust other farmers	1	2	3	4	5
I trust the municipal government and its policies towards agriculture	1	2	3	4	5
I trust the legal system	1	2	3	4	5
I trust the police	1	2	3	4	5
I trust the board members of the co-operative	1	2	3	4	5
Networks					
I get along well with my family	1	2	3	4	5
I get along well with my friends	1	2	3	4	5
I get along well with people in my community	1	2	3	4	5

I get along well with other farmers	1	2	3	4	5
I am willing invest capital to start a **co-operative** with other farmers which can process raisins to add value	1	2	3	4	5

6.2 Please indicate whether you are a member of the following types of organisations

Membership in organisations	**Non member**	**Inactive member**	**Active member**
Religious / Church group	1	2	3
Political party or group	1	2	3
Farmers' co-operative	1	2	3
Local government	1	2	3
Farmer study group	1	2	3

6.3 If you are a member of EAC, please indicate which of the following statements best describes you with regard to being a member of the board of EAC/EFA?

I have never served on the board of EAC/EFA	1
I have served on the board of EAC/EFA in the past	2
I am currently member of the board of EAC	3

7 Financial records

7.1 On a scale from 1 - 5, please rate the following statements with regard to financial record keeping

Statement	**Not at all**				**100%**
I make sure that my financial statements are kept up to date	1	2	3	4	5

7.2 What is the debt:asset ratio of your farm business?

8 Entrepreneurial characteristics

8.1 **Compared to other farmers in the region** please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

Statement	**Strongly disagree**				**Strongly agree**
I look for things that need to be done	1	2	3	4	5
When faced with a difficult problem, I spend a lot of time trying to find a solution	1	2	3	4	5
I complete my work on time	1	2	3	4	5
It bothers me when things are not done very well	1	2	3	4	5
I prefer situations in which I can control the outcome as much as possible	1	2	3	4	5
I like to think about the future	1	2	3	4	5
When starting a new task or project, I gather a great deal of information before going ahead	1	2	3	4	5
When I plan a large project, I break it into smaller tasks	1	2	3	4	5
I get others to support my recommendations	1	2	3	4	5

I feel confident that I will succeed at whatever I try to do	1	2	3	4	5
No matter who I'm talking to, I'm a good listener	1	2	3	4	5
I do things that need to be done before being asked to do so by others	1	2	3	4	5
I try several times to get people to do what I would like to do	1	2	3	4	5
I keep the promises I make	1	2	3	4	5
My own work is better than that of other people I work with	1	2	3	4	5
I don't try something new without making sure I will succeed	1	2	3	4	5
It's a waste of time to worry about what to do with one's life	1	2	3	4	5
I seek the advice of people who know a lot about the tasks I'm working on	1	2	3	4	5
I think about the advantages and disadvantages or different ways of accomplishing things	1	2	3	4	5
I do not spend much time thinking about how to influence others	1	2	3	4	5
I change my mind if others disagree strongly with me	1	2	3	4	5
I feel resentful when I don't get my way	1	2	3	4	5
I like challenges and new opportunities	1	2	3	4	5
When something gets in the way of what I'm trying to do, I keep on trying to accomplish what I want	1	2	3	4	5
I am happy to do someone else's work if necessary to get the job done on time	1	2	3	4	5
It bothers me when my time is wasted	1	2	3	4	5
I weigh my chances of succeeding or failing before I decide to do something	1	2	3	4	5
The more specific I can be about what I want out of life, the more likely I am to succeed	1	2	3	4	5
I take action without wasting time gather information	1	2	3	4	5
I try to think of all the problems I may encounter and plan what to do if each problem occurs	1	2	3	4	5
I get important people to help me accomplish my goals	1	2	3	4	5
When trying something difficult or challenging, I feel confident that I will succeed	1	2	3	4	5
In the past I have had failures	1	2	3	4	5
I prefer activities that I know well and with which I am comfortable	1	2	3	4	5
When faced with major difficulties, I quickly go on to other things	1	2	3	4	5
When I'm doing a job for someone, I make a special effort to make sure that the person is happy with my work	1	2	3	4	5

I'm never entirely happy with the way in which things are done; I always think there must be a better way	1	2	3	4	5
I do things that are risky	1	2	3	4	5
I have a very clear plan for my life	1	2	3	4	5
When working on a project for someone, I ask many questions to be sure I understand what the person wants	1	2	3	4	5
I deal with problems as they arise rather than spend time to anticipate them	1	2	3	4	5
In order to reach my goal, I think of solutions that benefit everyone involved in the problem	1	2	3	4	5
I do very good work	1	2	3	4	5
There have been occasions when I took advantage of someone	1	2	3	4	5
I try things that are very new and different from what I have done before	1	2	3	4	5
I try several ways to overcome things that get in the way of reaching my goals	1	2	3	4	5
My family and personal life are more important to me than the work deadlines I set for myself	1	2	3	4	5
I do not find ways to complete tasks faster at work or at home	1	2	3	4	5
I do things that others consider risky	1	2	3	4	5
I am as concerned about meeting my weekly goals as I am about my yearly goals	1	2	3	4	5
I go to several different sources to get information that will help me with tasks or projects	1	2	3	4	5
If one approach to a problem does not work, I think of another approach	1	2	3	4	5
I am able to get people who have strong opinions or ides to change their minds	1	2	3	4	5
I stick with my decisions even if others disagree strongly with me	1	2	3	4	5
When I don't know something, I don't mind admitting it	1	2	3	4	5

Business model

Please list the factors you consider when deciding:

9.1	To produce raisins rather than wine/juice.
9.2	What type of raisin to produce (Thompson/Golden/OR):

9.3 **SWOT-analysis**

Please list the strengths, weaknesses, opportunities, and threats to your raisin enterprise.

Strong points	**Relative importance**

Weak points	**Relative importance**

Opportunities	**Relative importance**

Threats	**Relative importance**

APPENDIX C

PROCEDURES TO MEASURE ECONOMIC LITERACY

1 PROCEDURES TO DETERMINE ECONOMIC LITERACY FACTORS AFFECTING COST EFFICIENCY

After the cost efficiency scores had been calculated, the next step was to identify the economic literacy determinants of inefficiency. The cost efficiency scores were used as the dependent variable. The results for questions asked on economic literacy were regressed against the efficiency scores to identify if economic literacy significantly influence cost efficiency levels of producers.

1.1 ECONOMIC VARIABLES HYPOTHESISED TO INFLUENCE ALLOCATIVE EFFICIENCY

The economic literacy variables that were hypothesised to influence cost efficiency include the question on transport, the demand question, knowledge of the exchange rate, knowledge of the prime interest rate and the question in which farmers had to demonstrate how they would allocate their production capital. Table C.1 shows the economic literacy variables used to determine the effect on cost efficiency, as well as the expected direction that the influence economic literacy variables will have on cost efficiency.

Table C. 1: Economic literacy variables hypothesised to influence allocative efficiency, measurement index and expected signs.

Variable	Measurement Index	Expected sign
Overall Economic literacy index	Economic literacy questions added together	+
Transport	1 if answered correctly, 0 if answered incorrectly	+
Demand	1 if answered correctly, 0 if answered incorrectly	+
Exchange rate	1 if answered correctly, 0 if answered incorrectly	+
Prime interest rate	1 if answered correctly, 0 if answered incorrectly	+
Water	Scale of 1 to 4 with 4 being most important	-
Fertiliser	Scale of 1 to 4 with 4 being most important	+
Labour	Scale of 1 to 4 with 4 being most important	+

Table C.1 shows that the overall economic literacy score, transport, demand, exchange rate and prime interest rate are hypothesised to have a positive effect on cost efficiency. Economic literacy was hypothesised to have an effect on how farmers make decisions on input usage and thus will influence the cost efficiency with which farmers produce. The higher the overall economic literacy index was, the more positive the influence on allocative efficiency of respondents. Transport, demand, exchange rate and prime interest rate represent farmers' economic literacy, indicating that farmers answering the questions correctly are more economic literate and this will in turn positively influence their cost efficiency. Respondents were expected to rank fertiliser as an important input, because fertiliser plays an important role in the quality and volume of raisin production. The importance of fertiliser as an input was hypothesised to have a positive effect on cost efficiency. How important farmers rated water was expected to have a negative effect on cost efficiency. Farmers do not pay for water and therefore it was expected that the more important farmers rated water the less cost efficient they would be. Labour was also considered to have a positive effect since farmers will not be able to sell a timely product if the labourers did not help with the harvesting. Chemicals were not included in the analysis since choice of water, fertiliser, labour, and chemicals are perfectly correlated.

APPENDIX D

QUESTIONNAIRE FOR THE CASE OF ZANYOKWE

DEPARTMENT OF AGRICULTURAL ECONOMICS
UNIVERSITY OF THE FREE STATE

FARMER QUESTIONNAIRE:2010

TO BE COMPLETED BY THE RESEARCHER ON BEHALF OF THE PRINCIPAL DECISION MAKER ON THE FARM. INFORMATION WILL BE STRICTLY CONFIDENTIAL

Respondent number _____ Date of interview

1 Socio economic questions

1.1 Age _____ years

1.2 Years of formal education (Matric = 12 years) _____ years

1.3 Years in farming _____ years

1.4 Gender of main decision maker

Male	Female
1	2

1.5 Number of people in your household _____

1.6 Number of people in your household that contribute to your household income _____

1.7 In which community is your farm?

Kamma Furrow	Burnshill	Lenye	Ngqumeya	Wolf River	Zanyokwe
1	2	3	4	5	6

1.8 Please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

Statement	**Disagree**		**Neutral**		**Agree**
The road network in the region is of a good quality	1	2	3	4	5
The water distribution network is in a good condition	1	2	3	4	5
The irrigation water is of a good quality	1	2	3	4	5
My soil is of a good quality	1	2	3	4	5

1.9 Did you take part in any cropping project during the 2010 season?

No	Yes
0	1

1.10 If yes, please indicate in what project(s) you have participated?

_____

2 Land ownership and tenure

2.1 Which of the following best describes your form of land ownership or tenure?

1	I own my land and have title deeds
2	I have a PTO for the land
3	I lease my land
4	Other (please specify) _____

3 Production activities

3.1 Did you buy additional inputs other than those supplied by ZCAC?

No	Yes
0	1

3.2 Complete the following table with regard to the **three major crops** produced in 2010 and the amount of inputs you've used **other than the inputs supplied by the ZCAC.**

Crop						
Hectares						
Yield						
Seed/seedlings	amount / kg	Cost ®	amount / kg	Cost ®	amount / kg	Cost ®
Fertiliser	amount (kg)	Cost ®	amount (kg)	Cost ®	amount (kg)	Cost ®
Water (h)						
Labor						
Type of Irrigation						

3.3 In your opinion, did you apply a sufficient amount of inputs to obtain an optimal yield?

No	Yes
0	1

Reasons	**Not at all**				**Very important**
Input costs are too high	1	2	3	4	5
I don't have sufficient cash flow by the time I need to apply the inputs	1	2	3	4	5
There isn't a sufficient amount of inputs available by the time I need to apply the inputs	1	2	3	4	5
I rather sell some of my inputs to other farmers to make some money	1	2	3	4	5
Other (specify).	1	2	3	4	5

3.4 Do you have access to credit to finance production?

NO	**YES**
0	1

Factor preventing access to credit	**Not at all**	**Very important**

I do not have title deeds of my land and thus I do not have the required collateral	1	2	3	4	5
I do not have a credit record at credit providers	1	2	3	4	5
I do not have family members with sufficient surplus money to fund me	1	2	3	4	5
Other	1	2	3	4	5

3.5 Do you **own** the following?

	NO	**YES**
Equipment / implements for land preparation	0	1
Equipment / implements to hoe	0	1
Equipment / implements to apply fertiliser	0	1
Equipment / implements to apply chemicals	0	1
Vehicle to transport vegetables to the buyer	0	1

4 Marketing behaviour

4.1 How much of your vegetables did you sell to:

Crop							Written agreement?	
	Amount	Income	Amount	Income	Amount	Income	No	Yes
Consumed self								
Community							0	1
Hawkers							0	1
Shops (i.e. Spar, Fruit & veg, Pick a Pay)							0	1
FPM							0	1
Traders							0	1
Other							0	1

4.2 To what extent do the following reasons influence your decision wrt whom to sell your produce?

Reasons	**Not at all**				**Very important**
I obtain higher prices	1	2	3	4	5
I obtain more market information	1	2	3	4	5
It is more convenient than other alternatives	1	2	3	4	5
ZCAC tells me to do so	1	2	3	4	5
Other (Specify)	1	2	3	4	5
	1	2	3	4	5

4.3 Which of the following best describes the way you deliver your vegetables to your buyer?

I use my own truck	1
Zanyokwe co-op delivers my vegetables to the market	2
The buyer comes to my farm to collect my vegetables	3
I pay someone to deliver my crop to the buyer	4
Other	5

4.4 On a scale from 1-5, what is the level to which you are able to influence the price you receive for your vegetables through negotiation (1=not at all; 5=100%)

Not at all	100%

1	2	3	4	5

4.5 Where do you get your production and marketing information?

	Production	**Marketing**
Other farmers	1	1
Buyers	2	2
ZCAC	3	3
Other:	4	4

4.6 What other information do you need that will help you to make more money from producing vegetables?

_____

_____

4.7 How many buyers do you consult before you sell your vegetables? _____

How long (hours) did it take you to determine which buyer to sell to? _____

How many transactions do you engage in with buyers? _____

4.8

Please answer **YES** or **NO** to the following questions	**NO**	**YES**
Do you plan to have future transactions with your current buyer?	0	1
Have you ever experienced delayed payment from the buyer?	0	1
Do you receive financial support/credit from the buyer?	0	1
Have you ever had conflicts with the buyer?	0	1
Do you always know current vegetable prices?	0	1
Do you own a vehicle/implements that are **specifically** used for the production and/or transporting of your vegetables?	0	1
Do you agree that the buyer withholds important information?	0	1
Do you sometimes tend to withhold information from buyers?	0	1

4.9 Please indicate the level to which you are willing to follow the prescriptions of Zanyokwe Central Agricultural Cooperative with regard to the following:

	Not at all				**100%**
What vegetables to produce	1	2	3	4	5
When to plant your vegetables	1	2	3	4	5
Who to sell your vegetables to	1	2	3	4	5

5 Product Control

5.1 **Compared to other farmers in the region** please indicate on a scale from 1-5 the level to which you **use** the following activities to ensure the highest possible **yield.**

Activity	**Never**				**Always**
Timely irrigation	1	2	3	4	5
Sufficient irrigation	1	2	3	4	5
Change irrigation application during season	1	2	3	4	5
Remove weeds	1	2	3	4	5
Apply chemicals	1	2	3	4	5
Timely fertiliser	1	2	3	4	5

Sufficient fertiliser	1	2	3	4	5
Buy inputs before spending income on other things	1	2	3	4	5

5.2 On average, how many hours do you spend per day in your fields? _____ hours/day

5.3 Please rank the following causes of the **low volume** of vegetables produced in terms of importance (1= most important, 3= least important):

1 Scale is too small to produce large volume of vegetables
2 I normally apply insufficient amount of inputs to produce large volume of vegetables
3 I'm waiting for new projects, hence there are some times when I have no crop on my field

5.4 Please rank the following causes for the **low income** generated from producing vegetables (1= most important, 3= least important):

1 I don't know when prices will be high, so I don't know when to plant
2 The input costs are too high, so I have to spend too much money to buy inputs
3 The buyers don't want to buy my vegetables since they say that the volume I produce and the quality of my vegetables are inconsistent.

6 Social Capital

6.1 Please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

	Strongly disagree		Neutral		Strongly agree
Optimism and Expectation of equal treatment					
My life will get even better in the future	1	2	3	4	5
Local government treats everyone equally	1	2	3	4	5
I would not be farming if I have an alternative source of income.	1	2	3	4	5
Satisfaction					
I am happy and satisfied with my life	1	2	3	4	5
Trust					
Generally speaking, do you agree most people could be trusted	1	2	3	4	5
I can safely say I am trustworthy	1	2	3	4	5
I trust my family	1	2	3	4	5
I trust my friends	1	2	3	4	5
I feel safe in my neighborhood	1	2	3	4	5
I trust the church and its people	1	2	3	4	5
I trust other farmers	1	2	3	4	5
I trust the municipal government and its policies towards agriculture	1	2	3	4	5
I trust the legal system	1	2	3	4	5
I trust the police	1	2	3	4	5
Networks					
I get along well with my family	1	2	3	4	5
I get along well with my friends	1	2	3	4	5
I get along well with people in my community	1	2	3	4	5
I get along well with other farmers	1	2	3	4	5

Country and community objectives					
The country must create more job opportunities	1	2	3	4	5
Community members should be more involved in policy making	1	2	3	4	5
Local government should concentrate on rising input prices	1	2	3	4	5
People are poor because they are lazy and have no will power	1	2	3	4	5
People are poor because they were not given the same opportunities as others	1	2	3	4	5
I have the power to affect the outcome of my farming activities.	1	2	3	4	5

6.2 Please indicate whether you are a member of the following types of organisations

Membership in organisations	**Non member**	**Inactive member**	**Active member**	**Do you trust members? (No=0, partially=1, yes=2)**		
				No	**Partially**	**Yes**
Religious / Church group	1	2	3	0	1	2
Political party or group	1	2	3	0	1	2
Farmers' co-operative	1	2	3	0	1	2
Local government	1	2	3	0	1	2
Farmer study group	1	2	3	0	1	2

7 Finance

7.1 On a scale from 1 - 5, please rate the following statements with regard to financial record keeping

Statement	**Not at all**				**100%**
My financial statements are kept up to date	1	2	3	4	5

7.2 Please indicate how much of your **total** household income is coming from the following activities:

Income generating activities	Rand	**%**
Vegetable production		
Livestock production		
Social grant		
Off-farm work		
Income from other household members		
Other		
		100%

7.3 What income do you need to pay for all your **living expenditure** (groceries, debt (lay-buys, etc.), school fees, medicine, etc.) _____ R/month

8 General

8.1 Please indicate on a scale from 1 to 5 the level to which you agree with the following statements:

	Disagree		Neutral		Agree
I attend **ALL** training sessions on vegetable **production**	1	2	3	4	5
I attend **ALL** training sessions on vegetable **marketing**	1	2	3	4	5

8.2 If you have attended any training sessions during the 2010 season, please indicate which organizations were responsible to present the training sessions.

8.3 The following scenarios represent the outcomes from a game played by tossing up a coin. The coin can either land on heads, or tails. Please choose the game that you would like to play.

	Amount to be won if:	
Game	Heads	Tails
0	R 50	R 50
A	R 45	R 95
B	R 40	R 120
C	R 30	R 150
D	R 10	R 190
E	R 0	R 200

8.4 Given the game you've chosen to play in the previous question, please indicate how much do I have to pay you not to play the game but rather to take the money I offer you?

	0	A	B	C	D	E
1		R 50	R 63	R 72	R 83	R 83
2		R 53	R 65	R 75	R 87	R 87
3		R 56	R 67	R 77	R 91	R 91
4		R 59	R 69	R 80	R 95	R 95
5		R 62	R 71	R 82	R 99	R 99

8.5 List the strengths, weaknesses, opportunities and threats to your farm business that affect your performance.

Strengths

Weaknesses

Opportunities

Threats (what makes you worried?)

8.6 How do you see the future of your farm business?

8.7 Where would you like to be in 5 years' time?

8.8 According to your opinion, what does a successful vegetable farmer looks like?

8.9 Where did you get any insights that help you to be more successful?

8.10 What makes you happy?

8.11 If you can ask government or anybody else **ANYTHING** that would help you to produce a high volume of a good crop, what would you ask?

APPENDIX E

CONSOLIDATED CAPACITY BUILDING REPORT

During the course of the project the following capacity building activities took place:

- Two students have successfully completed their Masters' degrees
    - Van der Merwe, E. 2012. *Economic literacy as a factor affecting allocative efficiency.* MSc Agric dissertation, Department of Agricultural Economics, University of the Free State, Bloemfontein. (Passed with distinction).
    - Khaile, P.M.E. 2012. *Assessing factors affecting technical efficiency of emerging raisin producers in Eksteenskuil, in the Northern Cape Province, South Africa*. MSc Agric dissertation, Department of Agricultural Economics, University of the Free State, Bloemfontein.
- The principal researcher will submit his PhD in June 2012.
    - Jordaan, H. (forthcoming). *New Institutional Economic analysis of emerging irrigation farmers' food value chains*. PhD thesis. Department of Agricultural Economics, University of the Free State, Bloemfontein.
- Four scientific papers were presented at national conferences.
    - Khaile, P.M.E., Jordaan, H., Matthews, N., and Grové, B. 2010. *Investigating factors causing inefficient use of resources: the case of emerging raisin producers at Eksteenskuil*. 4th South African National Commission on Irrigation and Drainage Symposium, Upington, 17-19 November 2010.
    - Jordaan, H. and Grové, B. 2010. *Analysis of the governance structure used by Eksteenskuil raisin producers: Is there a need for more vertical coordination?* Paper presented at the combined 3rd Annual Conference of the African Association of Agricultural Economists and 49th Annual Conference of the Agricultural Economics Association of South Africa, The Western Grand Cape Town Arabella Quays, Cape Town, 20-23 September 2010.
    - Jordaan, H. and Grové, B. 2009. Institutional economic analysis of raisin production and marketing in South Africa: learning from Eksteenskuil raisin producers. 47th Annual Conference of the Agricultural Economics Association of South Africa, Elangeni Hotel, Durban, 21-23 September 2009.

  - Jordaan, H., Grové, B., and Khaile, M. 2008. *Assessment of the contribution of water use to value chains in agriculture: a conceptual framework*. 3rd South African National Commission on Irrigation and Drainage Symposium, Langebaan, 18-20 November 2008.

- The principal researcher also presented a scientific paper while attending an international PhD-Winter School that was presented by the Institute for Agricultural and Fisheries Research (ILVO) in combination with University of Ghent and Wageningen University during February 2010 in Belgium.
  - Jordaan, H. 2010. *Developing a strategy for the sustainable integration of emerging farmers into mainstream agriculture within South Africa*. Paper presented at the PhD Winter School "An institutional approach to the analysis of systems, systems change and transition in natural resources", Vaalbeek, Belgium, 1-4 February 2010.
- The principal researcher and one of the students were invited as primary speakers at the 2009 Agricultural Economics Association of South Africa (AEASA) workshop titled: "Productive water use, value chains and mainstreaming emerging farmers".
  - Jordaan, H., Grové, B. and Khaile, P.M.E. 2009. *Assessment of the contribution of water use to value chains in agriculture: A conceptual framework*. Paper presented at the workshop convened by the Water Research Commission (WRC) at the 47th annual conference of the Agricultural Economics Association of South Africa (AEASA), Durban, September 2009.
  - Jordaan, H., Grové, B. and Khaile, P.M.E. 2009. *Assessment of the contribution of water use to value chains in agriculture: The case of Eksteenskuil raisin producers*. Paper presented at the workshop convened by the Water Research Commission (WRC) at the 47th annual conference of the Agricultural Economics Association of South Africa (AEASA), Durban, September 2009.
- One formal presentation was made during a feedback session for emerging farmers at Eksteenskuil.
  - Khaile, PME., Jordaan, H., Grové, B. and Matthews, N. 2010. *Faktore wat die doeltreffendheid beïnvloed waarmee Eksteenskuil rosyntjie boere hul insette gebruik*. Eksteenskuil, December.