An economic analysis of certified organic smallholders in Limpopo Province, South Africa

By

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DEDICATION

TO

My husband, **Cuthbert** and our daughter, **Hope,** whose support, encouragement and love are my greatest source of inspiration.

DECLARATION OF ORIGINALITY

I, Catherine Namome, declare that the thesis that I hereby submit for the degree of Masters at the University of Pretoria has not previously been submitted by me for degree purposes at any other University.

I take note that, if the thesis is approved, I have to submit final copies as stipulated by the relevant regulations by 15thJuly for the spring graduation ceremony and 15 February for the autumn graduation ceremony, and if I do not comply with the regulations, the degree will not be conferred upon me.

..... June 2013

The author

.....
Catherine Namome

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ABSTRACT

To date, research on organic farming and certification has focused on the production and trade possibilities of the industry. Farmers' opinions are underrepresented and this study endeavours to capture their opinions. In this study, the economic problem is to investigate the low participation of farmers in certified organic farming, highlight the economic benefits which are normally not clearly defined, as well as study the often complicated and frustrating certification process. The main objective is to investigate the determinants, which affect the smallholder farmer's participation, and to analyse farmers' perceptions of certified organic farming in the Limpopo Province of South Africa.

The specific focus was on the participation of smallholder farmers in certified organic farming. The dependent variable was participation as measured by a farmer's decision to either certify their farm or not. The independent variables included factors that make up farmer and farm characteristics, certification and market related characteristics. The study used a standard questionnaire to obtain information from farmers. The research methodology, analysis and the presentation of the study was quantitative. The study used descriptive statistics (percentages, means, standard deviations, Chi-squares and significance intervals) to evaluate the significance of the variables. These were analysed and described quantitatively by making use of EVIEWS and IBM AMOS software. In estimating the influential factors, a probit model was adopted, and in analysing farmer perception, structural equation modelling was used.

Descriptive statistics indicated that among farmers interviewed, the majority (61%) were female farmers and 39 per cent were male farmers. Among the female respondents, 46% participated in certified organic farming and 15 per cent of female farmers were not certified organic farmers. From the male group, 29 per cent were certified organic farmers and 7% were not. In determining factors influencing farmer participation, three of the variables were positively associated with the probability of participating in certified organic farming, these being: the age of the farmer, membership to a farmer organisation and market premium prices for certified commodities. The other five significant factors were negatively associated with the probability of participating in certified organic production. These factors were: the gender of the farmer, the farmers' income, farming experience, information access and certification costs. All these factors tended to decrease the likelihood of participating. With the exception of the farmers' income and farming experience, all the significant variables had the expected signs.

Farmers' perceptions of certified organic farming were analysed and the results showed that a high percentage of farmers had a positive view of certified organic farming. In other words, the perceived benefits of certified organic farming meet farmers' expectations. The perceived premium price of certified organic products is the most important factor affecting farmer perception. This is not unusual because South Africa's organic production is mainly focused on exportation and targets high value markets. As hypothesized, the costs associated with the certification process, that is: inspection costs (-0.578) and annual certification costs (-0.719), negatively affect farmer perception.

In conclusion, a combination of factors influence a farmer's decision as to whether or not to participate in certified organic farming. One cannot rely only on specific factors to determine farmers' participation in certified organic farming. Farmer perception of certified organic farming is also an important aspect. The more farmers positively perceive the farming enterprise, the higher the rate of participation will be. The same applies to the perceived costs, which have a negative impact on participation. The study finally recommends that government complete and put into practice the South African organic regulations, which may motivate farmers to get involved in certified organic farming and encourage local capacity building in certified organic farming. However, in the meantime, government should place an

emphasis on self-regulation within farmer groups and cooperatives for organic production, and set up a regulator to monitor the current activities. This would enhance interest from potential farmers, and strengthen consumer confidence.

The study further recommends that information on organic farming should be improved by encouraging more research in this area, which will enable farmers, consumers and regulators to access data on socio-economic, production and trade in the industry. Government should support or create a partnership between farmers and processors to establish cost effective processing of organic products and to increase the availability of processed products for market. Government should assist non-certified smallholder organic farmers to become certified, potentially resulting in a price premium for their products and enhancing export capabilities.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Globally, conventional farming has been intensely used as the leading agricultural practice. This farming system increases food production through the expansion of the farming area and increases the use of agro-chemicals. The long term effects of this farming practice do not, however, support sustainable agriculture and thus it is imperative to examine alternative food production systems (Beus & Dunlap, 1990: 22). The debate on the impact of conventional farming has been extended to social effects, the effect on soil productivity and on the ecosystem. In the midst of this debate, great expectations have been placed on the role of alternative farming practices such as organic farming, as a key alternative for farmers to maintain the ecosystem.

Organic agriculture is a farming system based on traditional and non-traditional methods to improve soil fertility and plant disease resistance without the use of synthetic fertilizers and pesticides (Raynolds, 2000). This approach builds on the use of organic manure (intercropping, crop rotation and biological pest control) in order to improve soil fertility and ecological balance (Freyer, 2007). Organic farming offers a combination of benefits such as environmental protection and better yields for farmers in the long term (Fuller *et al.*, 2005 & Ching, 2008). The commercial oriented part of organic farming is called certified organic farming. Certified organic farming is agriculture that meets organic production standards, and is subjected to organic inspection, certification and labelling (Scialabba & Hattam, 2002). It is aimed at domestic and international food markets. In South Africa, an organic farming initiative such as the Limpopo Market Organic Program is an example of organic farming systems in this country.

1.1.1 Defining organic farming in detail

When discussing the concept of organic farming, one has to understand that organic farming is a holistic system, with principles based on ecology (a scientific discipline concerned with the interrelationship of living organisms and their environments). This implies that farmers practicing organic farming are inspired by the natural eco-system and learn from them. Frequently, scholars and institutions describe organic farming as a system that does not use

chemicals (pesticides, fungicides and herbicides), antibiotics or Genetically Modified (GM) technologies. According to Dimitri, Oberholzer & Wellson, (2007) the theory underlying organic farming is that land should be farmed in an "ecologically friendly manner, paying particular attention to soil fertility maintenance." The International Federation of Organic Farming Movements (IFOAM), a representative body for organic farming globally, defines 'organic farming' according to four principles[1]:

- *The principle of health*. Organic farming seeks to sustain and enhance the health of our planet's soil, plants, animals and humans, for it regards it as one indivisible whole.
- *The principle of ecology*. Organic farming should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
- *The principle of fairness*. Organic farming should build on relationships that ensure fairness with regard to the common environment and life opportunities.
- *The principle of care*. Organic farming should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

In general, organic farming differs from conventional farming. In conventional farming, biological systems are, to a larger extent, replaced by technical systems. In organic farming, conserving the biological system is foremost compared to conventional farming. In conventional farming, crop rotations are supplanted by mono-cropping and organic manure is exchanged for synthetic fertilizers.

1.1.2 Who says it is organic? Where does organic farming come from? Development of organic farming as a farming system

The emergence of organic farming dates back to methods of traditional farming in cultural settings. Recently, organic farming with its lucrative market has led to a significant number of farm producers claiming to be producing organic products. One can only marvel at the originality of this industry. Therefore, the discussion that follows will describe the pioneers and the progress of organic farming from its inception. Some scholars suggest that farming practices before the introduction of the green revolution in the 1940s were based on organic

[1]For the four guiding principles see www.ifoam.org/about_ifoam/principles

farming. It could be an accurate assumption, since these farmers did not apply artificial substances to maintain their crops. Nevertheless, one needs to note that the organic farming practice we know today is a result of the tireless work of both pioneer farmers and research scientists.

To date, five scientists (Sir Albert Howard, Lady Eve Balfour, Rudolf Steiner, Hans Mueller and Hans Rustch) have contributed greatly to the development of the concept of organic farming (Heckman, 2006). However, the most influential of these was Sir Albert Howard, who conducted a series of outstanding experiments at various agricultural research centres in India. His work was based on how properly propagated crop varieties reacted to insects and pests and his findings identified the importance of using better soil management techniques, such as the maintenance of soil fertility (Heckman, 2006). His conclusions were that crop varieties grown on a piece of land with a steady supply of fresh humus (vegetable and animal wastes) resisted pests and that livestock that fed on such crops were resistant to diseases (Heckman, 2006).

As a result, Sir Howard suggested that there was a connection between healthy crop varieties, livestock and animals. Most of his work was published in the book, *An Agricultural Testament*, where he emphasised that fertiliser usage was not sustainable and thus the farming system he advocated was called organic. It received criticism as a system that was complex but focused on the very necessary interrelationships found in nature (Heckman, 2006). Lady Eve Balfour, after her university studies, instigated her Haughley experiment which was based on a comparison between organic and chemical based farming. She published her findings in a book *The Living Soil* and later co-founded the Soil Association, currently an international institute with a mandate to promote sustainable farming. Other organic farming pioneers that are not mentioned in the discussion above are included in the table below. Table 1.1 shows a timeline of events in organic farming.

Table 1.1: Timeline of events in the history of organic farming

Time	Events
1900s	Sir Albert Howard carried out agricultural experiments in India
1924	Rudolf Steiner's ran the very first courses on bio-dynamic farming
1939	Lady Eve Balfour conducted the Haughley experiment – the first long-term scientific comparison of organic and chemical-based farming
1930s/40s	Formation of the first bio-dynamic associations in Europe ('Demeter') Dr Hans Mueller active in Switzerland (Organic - biological farming otherwise referred to as 'Bioland' or 'BioSuisse).Sir Albert Howard published a land mark book – An Agricultural Testament
1943	Lady Eve Balfour published 'The Living Soil'
1946	Lady Eve Balfour founded the Soil Association in the UK
1972	International Federation of Organic Farming Movements (IFOAM) founded
1973	Research Institute of Organic Farming (FiBL) founded in Switzerland
1975	Foundation Ecology & Farming (SOEL) founded in Germany
1980s	The majority of other organic organisations and associations founded
1990	First BioFach Fair takes place in Germany, now the biggest fair for organic products worldwide
1991	EU 2091/91 – The European organic standard established. EU regulation 2078/92 published in official Journal or the European Union which established area based support for organic farming in most EU countries
1992	IFOAM Accreditation Program established
1999	Global *Codex Alimentarius* standards on organic farming published

Source: Willer and Yussefi (2004)

In Africa, scholars suggest that organic farming commenced in about 1898. It is believed that the first organic gardens were established at Peramiho in southern Tanzania (INR, 2008). Other African countries have also adopted the organic farming system and are ahead of Tanzania. Kenya, South Africa and Uganda are some of the leading organic producing nations. In Uganda, for example, the development of organic farming was a result of the export market to European countries. In 1994 commercial companies began engaging in organic farming, seeking an export market (INR, 2008). There was also a general movement in the agricultural sector to develop sustainable farming as a means of improving livelihood. Several NGOs, CBOs and, importantly, the government promoted an approach to farming which would allow for the safeguarding of food security, provide income, maintain soil fertility and control pests (INR, 2008). This provided a solid foundation for the development of organic farming. The emphasis on the nature of organic farming (such as use of local knowledge and traditional farming systems) also appealed to the Ugandan people, which may have motivated their ready acceptance of this farming system.

In South Africa, organic farming has developed from small informal groups producing organic products to a rapidly growing and formalised sector. As there is no formal detail on

the history of organic farming in South Africa, we may assume that the formalisation process began with the establishment of the Organic Farming Association of South Africa (OAASA) in 1994. The organic sector in South Africa is estimated to have an average of 250 farmers that cultivate crops on about 515 000ha of land (Van Zyl, 2000 & Parrot, Van Elzakker & Eco, 2003).

1.1.3 Extent of certified organic production in developing countries

Organic farming is evolving in developing countries and its influence on agricultural land and farms continues to grow. According to the study on the world of organic agriculture by Willer and Kilcher (2011), agricultural land under organic farming is continually growing, with 32.2 million hectares being managed by about 1.2 million producers. In their study, they report that more than one quarter of the world's organic farmland (nine million hectares) is located in developing countries. The majority of this farmland production is in Latin American countries, with Asia and Africa in second and third place respectively. Figure 1.1 shows statistics of developing countries with the largest areas under organic farming.

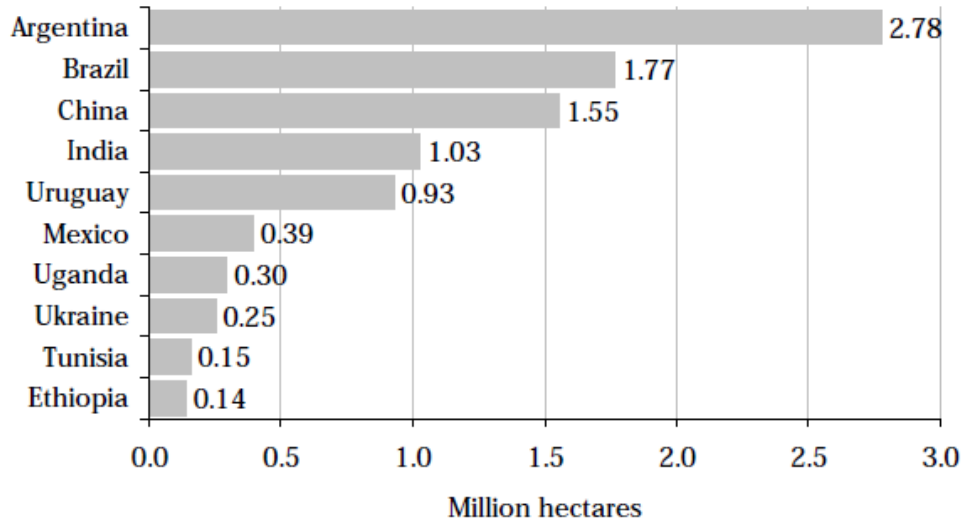


Figure 1.1: Share of organic farm land in developing countries (Willer and Kilcher, 2009)

In Africa, statistics for organic production show that in 33 countries, 0.9 million hectares of certified organic farmland is managed by at least half a million producers. Countries with the largest organic farmland are Uganda (296 203 hectares), Tunisia (154 793 hectares), Ethiopia (140 308 hectares) and Tanzania (62 486 hectares). By 2007, South Africa had a representation of 50 001 hectares of organically managed farmland with 500 farm producers. Table 1.2 shows organic farmland and producers in Africa.

Table 1.2: Organic farmland and producers in Africa

Countries	Year	Org. Managed Land (ha)	Share of total agricultural land	Land fully converted (ha)	Land under conversion (ha)	Producers
Algeria	2006	1'550	0.00%	-	-	-
Benin	2007	1'488	0.04%	-	-	2'354
Burkina Faso	2007	7'267	0.07%	7'267	-	5'808
Cameroon	2007	336	0.00%	267	69	92
D R Congo	2007	6'068	0.03%	5'923	145	1'053
Egypt	2006	14'165	0.40%	-	-	460
Ethiopia	2007	140'305	0.41%	138'845	560	165'560
Gambia	2006	86	0.01%	-	-	-
Ghana	2008	24'449	0.17%	24'449	-	3'900
Guinea-Bissau	2007	5'600	0.34%	5'500	100	401
Ivory Coast	2007	943	0.00%	942	-	-
Kenya	2007	4'636	0.02%	4'250	386	1'811
Madagascar	2006	9'456	0.02%	-	-	5'455
Malawi	2002	325	0.01%	-	-	13
Mali	2007	3'402	0.01%	3'402	-	7'526
Mauritius	2006	175	0.15%	-	-	5
Morocco	2008	3'590	0.01%	3'590	-	-
Mozambique	2006	728	0.00%	-	-	1'928
Namibia	2007	80	0.00%	-	-	6'000
Niger	2007	131	0.00%	49	82	-
Nigeria	2007	3'254	0.00%	52	3'102	-
Rwanda	2007	13'356	0.69%	1'656	11'700	2'565
Sao Tome and prince	2007	2'862	5.02%	-	-	1'179
Senegal	2007	1'589	0.02%	763	825	1306
South Africa	2007	50'012	0.05%	45'356	4655	500
Sudan	2007	56'324	0.04%	55'324	-	-
Swaziland	2007	3	0.00%	-	3	-
Tanzania	2007	62'180	0.18%	35'706	26'475	90'222
Togo	2007	2'545	0.07%	2'519	26	4'183
Tunisia	2006	154'793	1.58%	-	-	862
Uganda	2007	296'203	2.33%	296'203	-	206'803
Zambia	2007	2'530	0.01%	-	-	20'000
Total		870'329	0.10%	632'063	48'228	529'986

Source: Willer and Kilcher (2009)

In Asia, countries such as India and China have extensively developed organic production systems. In India, organic farmland (1 030 311 hectares) represents 0.6 per cent of the agricultural land with an exporting value of 53 million Euros in 2007, which represent about 0.2 per cent of the global organic market (Willer & Kilcher, 2009). In Latin American countries, organic farming is relatively developed and in 2007, organic agricultural land was estimated at 5 million hectares which is approximately one per cent of the total agricultural area. Brazil leads with 800 000 hectares, followed by Argentina and Ecuador. Mexico has the largest number of organic farms followed by Peru.

1.2 PROBLEM STATEMENT AND JUSTIFICATION

Certified organic farming is oriented towards global commodity chains and is intended to bring benefits to producers by offering premium prices for certified organic produce, and as such, can be viewed as a form of commercialised agriculture that improves farmers' livelihoods (Barrett, Browne, Harris & Cadoret,2001; Parrott, Olesen & Høh-Jensen, 2006). However, the challenge is that only a few smallholder organic farmers participate in certified organic farming. Participating in certified organic farming has been studied by some scholars and they have indicated a range of constraints. These studies show that the leading constraints are the unsatisfactory certification system, market risk and the lack of assets, market information and training (Barrett, Browne, Harris, & Cadoret, 2002; González & Nigh, 2005; Bennett, 2008; Bolwig, Gibbon & Jones, 2009; Barrett *et al.*, 2011; Blanc & Kledal, 2011; Bravo, Spiller & Villalobos, 2012). For smallholder organic farmers, the reality is that solving these barriers presents a challenge because the majority of them lack the technical and financial resources needed to adapt quickly to these hindrances (Hellin & Higman, 2002).

Another limiting factor in farmer participation is farmers' perception of organic farming. This study therefore focuses on the two main causes of low farmer participation in certified organic farming, which are the certification structure and farmer perception. This is important as it will enable us to identify policy options that will fast forward the transition of small organic farmers to commercial operators.

1.3 OBJECTIVES OF THE STUDY

Commercialisation of smallholder farming, particularly certified organic farming suggests increased participation, or rather, an improved ability to participate, in high value markets. In most developing countries such as South Africa, smallholder farmers find it difficult to participate in certified organic farming because of a range of factors that reduce the incentive for participation. These may be due to the perception of smallholder farmers towards certified organic farming, or rather; it may be a problem with the certifier, the certification process and market inabilities. Organic certification is associated with high costs and a complicated farming system with stringent regulations. These problems deter poor smallholders with few resources from participating in certified organic farming (Barrett *et al.*, 2002 & Bennett, 2008). Therefore, until now the effect of organic certification and farmer perception have been cited as hindrances to participation in several agricultural programs.

The main objective of this study, then, is to investigate the low participation of farmers in certified organic farming, highlight economic benefits, which are not clearly defined as well as study the possible complicated and frustrating certification process. Furthermore, the study endeavours to identify determinants that may affect smallholder farmer participation and also analyse farmer perception towards certified organic farming in the Limpopo Province of South Africa. The identification of these determinants could assist in identifying policy interventions and / or institutional innovations to alleviate constraints and improve the ability of smallholder organic farmers to be part of the commercial agricultural economy. These determinants differ between certification characteristics and market characteristics as well as farmer characteristics, farmer perception and farm enterprise characteristics. The specific objectives of the study are to:

- Review the organic farming industry of South Africa by analysing the impact of international standards and regulations, identify who provides certification, how certification is carried out, and to discuss the challenges in the organic certification process;
- Assess characteristics of smallholder organic producers and use these to model determinants of farmer participation;
- Analyse farmers' perception of certified organic farming and its subsequent influence on the participation decision using Structural Equation Modelling; and

- Investigate and identify underlying determinants influencing farmers not to participate in certified organic farming, and thereby identify recommendations that can promote sustainable certified organic farming in the country.

Thus, this study aims to find ways of hastening the participation of smallholder organic farmers into commercial agriculture.

1.4 HYPOTHESES

This study mainly theorises that a low level of participation by farmers in certified organic farming is because of poorly defined economic benefits as well as a possible complicated and frustrating certification process for farmers. The study further hypothesises, that farmers' perception (i.e. perceived benefits and costs) of certified organic farming has a subsequent influence on participation. These hypotheses are based on a firm assumption that farmers were trained in certified organic farming and were well aware of its implications. Specific hypotheses are set out below for a detailed understanding.

- The study hypothesises that, if non-certified organic farmers access premium prices for their non-certified organic commodities, fewer farmers will participate in certified organic farming because farmers will achieve lower production costs;

- It is also hypothesised that premium prices for certified organic products do attract farmers, and thus, they are inclined to participate in certified organic farming;

- The lower the costs in certified organic farming, the higher the probability that farmers will participate in certified organic farming; as lower input costs make certified organic farming more attractive;

- The higher the perceived benefits of certified organic farming, the higher the likelihood that farmers will participate in this farming option; and

- The higher the perceived costs, the lower the rate of farmer participation in certified organic farming.

1.5 ANALYTICAL METHODS

The study employs two analytical methods to test the above-mentioned hypotheses: firstly, descriptive statistics are applied to the basic characteristics of the sample farms in order to assess the difference in farmer participation. This method uses percentages, frequencies, means and standard deviations. Secondly, binary and structural models are applied to identify and test significant factors of farmer participation and analyse farmer perception. The models involve the probit model and a structural model. The probit model is estimated to determine the factors that influence a farmer's decision to participate in certified organic farming. Then the structural model is estimated to analyse farmer perception towards certified organic farming. The analysis is based on information collected in the Limpopo Province. The subsequent sections give an overview of the salient features of the Province from which the study sites were selected. The procedures for data collection will also be discussed.

1.6 STUDY AREA

1.6.1 Overview of the Limpopo Province

The study area, Limpopo Province, is situated in the northern part of South Africa and it is adjacent to Gauteng, Mpumalanga and the Northwest Province and shares borders with Botswana, Zimbabwe and Mozambique. The Province covers 9.6 per cent of South Africa's total area (125 754km^2) (DBSA, 1998; Makhura, 2001; STATS, 2003). The Province is divided into six districts i.e. Capricorn, Bohlabela, Mopani, Sekhukhune, Vhembe and Waterberg districts.

Limpopo Province can also be divided into several topographic zones i.e. in the east part of the Province, the area is characterised by a flat gently undulating Lowveld plain, in the west it is bounded by the northern Drakensburg escarpment and Soutpansberg with steep peaks and slopes (DBSA, 1998). The major sources of water are the Limpopo River, which is located in the north and the Olifants and Letaba Riversthat are in the far south. All rivers are heavily utilised for irrigation, especially east of the escarpment. However, most parts of the Province are dry with occasional drought seasons especially in the north. Soils are characterised as

black and red fertile clay, which occur in the Springbok flats, and sandy loamy soils are in the north and west of the Province.

Agriculture utilises about 8 million ha of land. Of the 8 million hectares of land, 10 per cent is utilised as arable land, 67 per cent as natural grazing, 10.4 per cent for nature conservation, 1.1 per cent for forestry and 2 per cent for other purposes (DBSA,1998). In 2001, five million people lived in the Province, making it the fourth largest Province, with approximately 13 per cent of the country's total population and of which 90.8 per cent resided in rural areas (STATS, 2003). Agriculture in Limpopo Province is diverse, with most farmers focusing on the production of field crops, which are dominated, by maize production. However, the main farming enterprises in the Province put more emphasis on the production of vegetables (Makhura, 2001). Production of vegetables contribute an average of 22 per cent to gross income in agriculture while citrus and subtropical production amounts to 64 per cent.

1.7 DATA AND THE SURVEY

1.7.1 Population

In this study, the population consisted of certified and non-certified organic farmers who participated in the organic programme in the Mopani and Vhembe districts of the Limpopo Province.

1.7.2 Sample size

To obtain a sample size, three factors were taken into consideration: (i) the desired level of confidence, (ii) the assumed incidence of the variable of interest and (iii) the acceptable marginal error. 72 farmers were selected from the survey population of 301 farmers. These respondents were surveyed using the minimum sample size formulae of Fowler (2002) as shown below.

$$n = \frac{[Z\alpha/2]^2 \, P \, [1-P]}{m^2}$$

where;

n = Required sample size
$Z\alpha/2$ = Confidence level 95% (standard value of 1.96)

p = Assumed incidence of finding an organic farmer (0.05)
m = Acceptable margin of error at 5% (standard value of 0.05)

The resultant sample is;

$$n = \frac{(1.96)^2 \times 0.05 \times (1-0.05)}{(0.05)^2}$$

n = 72 farmers

Therefore, the sample size was 72.

1.7.3 Sampling technique

This study used a systematic sampling technique. Systematic sampling (or interval random sampling) is a probability sampling procedure in which a random selection is made of the first element for the sample, and then subsequent elements are selected using a fixed or systematic interval until the desired sample size is reached (Levy & Lemeshow, 2008). In this study, the total number of farms in the surveyed area added up to 72. The selection criterion was based on the premise that the farmers were organic farmers and, Mopani and Vhembe districts were chosen as they were areas with a high concentration of organic farms. The first farmer was randomly selected from the farmer registry available at the provincial administrative offices and at every fourth interval; a farmer from the list was selected.

1.7.4 Data collection

Primary data was collected in the Limpopo Province, specifically, in Mopani and Vhembe districts from October through to November 2010, following two stages; group discussions with community farmer groups and face-to-face interviews with individual farmers. The face-to-face interviews were conducted with 72 systematically selected farmers. All respondents were requested to answer a set of structured questions. The respondents were given the opportunity to consult with other cooperative members. The responses from the face-to-face interviews were reviewed and based on this; relevant issues were identified. These aspects were then presented and discussed during a farmer group discussion. The group consisted of a number of farmers who then elaborated on the issues. The groups were composed of both certified organic and non-certified organic farmers. These were convened through district extension officers. Secondary information was collected from various sources such as books,

journals and research reports which related to organic farming, certification and policies. Unpublished materials were also used.

1.7.5 Survey Questionnaire

A measuring instrument is of high importance as it provides reliable and valid data (Saunders, Lewis & Thornhill, 1997). A questionnaire comprises of a written set of questions that are to be completed by respondents (Welman & Kruger, 2001). The questionnaire was designed to achieve the research objective as well as obtaining additional information. A structured questionnaire was used as the main instrument to gather information at a farm level**.** The questionnaire was prepared in English but translated into the local language that was used during the interviews with the help of extension officers.

The questionnaire was pre-tested on respondents in similar communities. This was done purposely for clarity, acceptability, reduction of repetition and ease to farmers. After a trial run of the questionnaire, variables that were intimidating to farmers such as family income or off-farm income were removed from the updated questionnaire. The questionnaire also included general information on what was expected from respondents as well as instructions on how to complete the questions. Two extension officers were recruited from the study area. Their recruitment was based on two criteria, namely, familiarity with the local language and the feasibility and accessibility they had with farmers.

1.7.6 Data Variables Collected

As mentioned above, a questionnaire was used to collect a wide range of information. This included information about certification characteristics, market characteristics, farm characteristics, as well as farmer characteristics, and farmers' perceptions towards certified organic farming. Specifically, the following information was collected and utilised:

- Data on farm and farmer characteristics included, gender, age, education and ownership of land holdings. Other information collected pertained to income and assets. These included, wage income, pensions, arable land ownership (full ownership or communal). Information regarding farmer's access to markets and constraints to market access was also collected.

- Information on certification included the costs of applying and acquiring certification (certification costs), the benefits of applying for certification, changes in farming practices based on the requirements for certification, benefits of certified organic farming and market prices for organic products.
- Data variables on farmer perception ranged from two constructs i.e. perceived benefits and perceived costs. The perceived benefits construct had variables such as premium prices, access to markets, better farming options, improved farm image, social capital, and, the perceived costs construct had variables such as certification costs, infrastructure costs, and inspection costs.

1.8 DATA ANALYSIS

The analysis and presentation of the study is quantitative. The study used descriptive statistics (percentages, means, standard deviations, Chi-squares and significance intervals) to evaluate the significance of the variables. These were analysed and described quantitatively by making use of EVIEWS version 7 and International Business Machines AMOS. In estimating the influential factors, a probit model was adopted. Variables, which played significant roles for the incidence of participation in certified organic farming, were analysed through this model. The determination of the coefficients and testing the statistical significance of relationships between the factors and the dependent variable (participation) was utilized. A significance level of 0.05 (confidence interval of 95%) was adopted to accept or reject the hypothesized assumption.

1.9 STRUCTURE OF THE THESIS

This study is organised into eight chapters, the first of which is the background and introduction. The literature review in the second chapter discusses the economic studies of smallholder organic farming in developing countries. The third chapter presents a review of the South African organic farming sector. In this chapter, the standards and regulations governing the industry are discussed. The fourth chapter presents a conceptual and theoretical model for farmer participation in certified organic farming. Chapter five is a discussion on the characteristics of smallholder organic producers (both certified and non-certified farmers). The results of the model are presented in chapter six. Analysis of farmer perception

towards certified organic farming is presented in chapter seven. Finally, the thesis summary is presented and conclusions are drawn in chapter eight.

CHAPTER 2: REVIEW OF ECONOMIC STUDIES ON SMALLHOLDER ORGANIC FARMING IN DEVELOPING COUNTRIES

2.1 INTRODUCTION

This study is an economic analysis of certified organic smallholder farming in South Africa. It endeavours to determine the factors that influence the decision of these farmers to participate in the commercially driven farming system, that is, the decision to certify their farms or not. The objective of this chapter is to review studies that have researched the economics of organic agriculture from developing countries. Specifically, this chapter reviews related studies on the economics of organic farming and factors affecting the viability of smallholder organic farming. Studies on the economics of certified organic farming are relatively common in the production and trade of organic farming. A number of studies in economics of certified organic production relate to the impact of certification and market access, profitability and costs of certification, all of which influence farmer participation and are associated with it.

2.2 PROFITABILITY AND COSTS OF ORGANIC CERTIFICATION

Farmer participation in an enterprise such as certified organic farming always be influenced by the potential of increased revenues and lower associated costs. In reviewing the economic performance of organic farming under certification, studies such as a comparative analysis of conventional and organic farming by Uematsu and Mishra (2012) are used. They investigated whether organic farmers were better off compared to conventional farmers, and they reported that certified organic farmers did not earn significantly higher incomes compared to conventional farmers.

Lampkin (1994) summarized various studies on the economics of organic farming with a number of different crops in South and West England and parts of Scotland and Wales. He concluded that the organic farming systems were more diverse in terms of enterprise mix; had lower yields and higher labour costs that were not fully offset by reduced input costs. Unlike non-certified organic farmers, certified organic farmers had an additional annual cost in order

to retain their status for trading organic products(Thamaga-0Chitja,2010). The cost of certification depends on many factors, including the use of local certification bodies versus international bodies; the history of chemical application; farm size; and, the distance travelled by the inspector to the farm. Initial group certification in South Africa can be as high as R16 000, with annual costs ranging from R16 000 - R20 000 to remain certified (BODCA, 2006).

A study by Padel and Zerger (1994) reviewed the costs and returns of organic farming and found that organic farming under certification was profitable. They reported that the farming system initially provides lower yields but these are offset by reduced costs of input and premium prices for most of the crops. Several farmers interviewed in this study, explained that financial stability was the main reason for participating in organic farming. The introduction of support schemes for conversion and the continuation of organic farming also made a significant impact on profitability. Other studies, by Cacek and Langner (1986) and Henning (1994), reported yields of about 30 per cent more in organic production when compared to conventional production. They concluded that farmers were strongly convinced that organic farming was profitable. A comprehensive study that was carried out in China and Brazil reported that farmers indicated that they had improved revenues and prices (Oelofse *et al.*, 2010). A common conclusion is that revenues and lower variable costs compensate for reduced yields to give similar gross farm margins (Bolwig *et al.*, 2009 & Gibbon, Lin & Jones, 2009).

2.3 ECONOMIC BENEFITS OF CERTIFIED ORGANIC FARMING

In the previous section, economic performance of organic farming under certification was reviewed. Here we review the poor economic returns of certified organic farming. Farmers who do manage to comply with the requirements of organic certification benefit from the system in the long run. The effective implementation of certification requirements fulfil the economic functions of the system. Certified organic farming provides several benefits but the most obvious benefits are the assurance of the organic market, premium prices and social capital.

Market access

Farmers, particularly those in direct contact with farmer groups, have always indicated that organic certification provides easier access to both organic and conventional markets. Burgess (2000), in her study of market access for organic farmers revealed that farmers regard organic certification as a tool that adds value to their products. Harris, Browne, Barrett & Cadoret, 2001) in their study point out that one of their respondents from Zambia stated, "This is not just added value; it is the difference between a market or not". Obtaining full certification enables farmers to secure a market. They explain that conventional farmers do not often find a market for their commodities as readily as the organic farmers do. This result may indicate that as consumer preferences change towards conventional farming, a market for such commodities may be limited compared to organic products.

Premium price

Harris *et al.,* (2001) established that farmers are paid a premium price for organic produce that carries an international certificate because it is destined for an export market that is different from the premium that local consumers pay in supermarkets. Organic farmers are successful in agricultural markets, even when their products are not exported, as they can still be sold in the domestic market. They explain that the organic price value is calculated as a percentage over and above the conventional price. For example ,studies by a Dutch Agro Eco Consultancy, working on behalf of the EPOPA programme in East Africa, have estimated that smallholders have the benefit of a 15-30 per cent higher farm-gate price on organic produce (Van Elzakker & Tulip, 2000).

The premium price of certified organic products reflects the quality, as well as the costs of meeting certification requirements. It also reflect the more direct trading structures in which a farmer is involved For example, farmers that are supported by EPOPA have better chances of obtaining a higher premium price. The complicating issue is the rate at which the premiums are consumed by certification and inspection fees. Harris *et al.* (2001), explain that theoretically, these fees could render the premium worthless. However, these farmers are always subsidised in the initial phase of becoming certified. In South Africa, subsidised fees

are not common for smallholder farmers. Most of these farmers pay their certification related fees as an investment in their economic activity.

Other advantages may not stand out as economic benefits but are essential in helping farmers to access markets, obtain credit and relate to other farmers. Such benefits include social capital which a farmer requires in order to stay abreast of organic related aspects. Coleman (1988) explains that social capital involves social structures or networks which improve farmer decisions to participate in a given farming practice or trade. Social capital includes components such as obligations, expectations, channels of information and social norms. It creates relationships with other partners, which is important for the development of the farmer. In certified organic farming, smallholder farmers are organised into farmer groups or co-operatives and work together under the internal control system which develops strong social connectedness among farmers, (Uphoff & Wijayaratna, 2000). The developed social network is regarded as an input that facilitates the access and use of information from other partners, in this case, farmers, retailers and other related consumers.

2.4 FACTORS AFFECTING THE VIABILITY OF ORGANIC FARMING IN DEVELOPING COUNTRIES

Organic farmers, like any other farmer from developing countries, face a number of challenges in producing their products. Several factors affect the viability of the organic farmer such as free trade and dumping by developed countries. However, the major factors include transaction costs, production factors, marketing factors and resource related factors.

2.4.1 Transaction Costs

Relatively little empirical research has been devoted to the effects of transaction costs in organic farming in developing countries. This is surprising, given the importance of such costs in the decision making of farmers to participate in commercial farming enterprises, according to MacInnis (2004). Smallholder farmers produce products in an imperfect commercial environment where transaction costs can be so high that farmers are unable to participate in commercially driven farming enterprises. Some studies have tried to

investigate the effects of transaction costs on economic agents. In some cases, researchers have examined the different markets exhibiting different structures of transaction costs to reveal market choices (Hobbs, 1997; Bailey &Hunnicutt, 2002). A study of opportunities and challenges in organic farming by Giovannucci (2006) reports that smallholder organic farmers are heavily affected by transaction costs. In her study, costs of getting certified represented up to 25 per cent of farmers' operating costs. She elaborates that there are indirect costs such as training, marketing, and coordination, which are expensive and difficult to manage by farmers.

An inclusive study of transaction costs and organic marketing by MacInnis (2004) categorized transaction costs into information costs, negotiation costs and monitoring costs. The variables used to assess these costs were based on the cost of obtaining certification, the cost of obtaining access to markets and the cost of searching for the best prices. Variables used as proxies for negotiation or monitoring costs were based on the distance between the producer and the market or delivery point; the proxy for negotiation cost, and the failure of buyers to honour their commitments and provide prompt payment. With the use of cross-sectional farm level data, he derived empirical evidence that the effects of transaction costs are asymmetric among farmers and the most affected farmers are those in the conversion period (MacInnis, 2004).

2.4.2 Credit and land tenure policies

There is limited formal financial on-farm credit available for organic production to the smallholder farmer. A study of the adoption of organic agriculture among smallholder organic farmers in Latin America and the Caribbean by Damiani (2003) reports that smallholder organic farmers face difficulties in gaining access to formal credit because financial organisations do not recognise the differences in crops. In their study, they give an analogy showing financial organisations usually provide credit to a crop such as coffee but not organic coffee because the latter exhibits specific characteristics and financial requirements. In the same study by Damiani (2003), he reports that smallholder organic farmers have unstable land tenures which make them unable to produce organic products. He reports that the main reason for such instability is the conversion periods that organic systems

have to incur before getting full certification. Improper land tenures hamper development of these small farms because of the concentration of farm land by powerful land owners (Griffin, Khan & Ickowitz. 2002).

2.4.3 Marketing factors

A number of studies have identified a range of factors prohibiting market access by farmers. These include high transaction costs and problems of asymmetrical information, low local effective demand, and lack of competition among buyers leading to low prices (North, 2000; Kindness, Gordon & Britain, 2001; Kherallah &Kirsten, 2002). A study by Mthembu (2005) identified marketing barriers as those related to resources, information and high transaction costs. Lack of access to markets and market intelligence for a niche market, such as organics, is detrimental to the growth of smallholder certified organic farms according to Thamaga-Chitja (2010). In their study, farmers expressed that they were incapable of identifying and retaining niche markets due to a lack of experience in marketing. Other marketing challenges identified were the lack of understanding how the formal market works, pricing information and payment structures.

Temu and Temu (2005) attribute lack of farmer access to high value markets; changes in market chains in importing countries (where a few large retailers now prefer to deal directly with producers); the presence of oligopolistic buyers in domestic markets; and increasing demand for value added products which demand substantial capital investments unaffordable to small producers in this case. Hallam *et al.* (2004) argue that market access by smallholders is constrained by the need to comply with legal and commercial requirements (pesticide residues, phyto-sanitary requirements and hazard analysis), which impose additional costs on smallholders and renders their production system economically unviable.

2.4.4 There are other limiting factors that require new institutions

Perhaps the most detrimental factor to the development of smallholder organic farming is the lack of institutions that can provide the necessary components of an organic system. As a result, most of the smallholder organic farmers fail to participate in commercially oriented

farming enterprises. Because of the uncertainty of the organic sector about economic agents and institutions, many organic farmers could be deterred in participating. In such a farming environment, farmers generally do not have the required information on certification and the means to locate better assets. This implies that farmers without proper information access and assets cannot interact more effectively.

In the South African situation, the lack of policies governing organic farming is problematic for those who are certified and those who wish to acquire certification (BODCA, 2006). Although there are some certification bodies, most of these rely on foreign standards which do not develop the local farmers' capability since they rarely understand local conditions (Banados & Garcia, 2001 & Barrett *et al.*, 2002). Scialabba and Hattam (2002) concluded that the development of a successful organic system requires a favourable policy environment Thus, it is evident that a lack of policies prevents smallholder organic farmers from participating in commercial farming enterprises. There is a need for institutions that can overcome barriers to farmer participation in commercially driven farming enterprises. Research is therefore needed to identify and suggest policies and strategies to overcome these barriers. This is based on the argument that transaction costs, which form part of certification costs can prevent farmer participation in certified organic production. It is expected that such research could show which policy interventions are mostly required.

2.5 SUMMARY

This chapter has provided a literature review of related economic studies in smallholder organic farming from developing countries and some developed countries. Most of these studies relate to the general economics of organic farming and other related farming systems. The economic benefits of organic farming were discussed as well. In fact, the chapter also attempted to explain different factors that adversely affect smallholder farmers and hinders them from fully participating in organic farming. Transaction costs, marketing, credit and land tenure policies were presented. Factors such as transaction costs emanate from different sources. Generally, these costs can be distinguished as certification costs, information costs, monitoring costs and the cost of keeping the agreement. The literature review conveys the general impression that empirical research on smallholder organic farming has not kept pace

with other farming enterprises. Although there are some studies researching these factors, at present, few analyse in detail the effects of certification on smallholder farmer behaviour. This study attempts to add to the theoretical and the empirical analysis of the literature on smallholder farmer behaviour. In the next chapter, an in depth review of the South African organic sector is presented.

CHAPTER 3: AN ANALYSIS OF THE ORGANIC FARMING INDUSTRY IN SOUTH AFRICA

3.1 INTRODUCTION

This chapter introduces the state of organic farming in South Africa, its certification system and the regulations that undergird it. The first section presents a discussion on the actual organic production South Africa and highlights the status and actors promoting the sector. The second section discusses the structure and important features of the institutional environment of organic farming. Lastly, the chapter concludes with an overview of the South African certification system and highlights the shortcomings of the institutional setting of organic farming in South Africa.

3.2 ORGANIC PRODUCTION IN SOUTH AFRICA

Previous studies conducted by Van Zyl (2000) estimated that there were about 350 to 700 hectares of land that was under certified organic farming with an estimated turnover of R40 million. In 2003, Parrott *et al* (2003), estimated that 45000 hectares of land was under certified organic farming which represented about 0.54 per cent of the total farming units. Willer, Rohwedder and Wynen (2009) estimate that in South Africa, about 500 organically certified farmers produce crops on approximately 50,012 hectares of land. Most of the crops produced are bananas, avocado, pears and mangoes, while the largest vegetable crops produced are tomatoes, asparagus, brassicas and potatoes (INR, 2008)[2].

3.2.1 Economic actors in the South African organic farming environment

Several actors provide key support to organic farming enterprises in South Africa. Three main organisations are key players in terms of coordinating and supporting organic farming at a national level. However, the organic sector is largely driven by private enterprises, government projects, farmer groups or cooperatives and NGOs. The private sector normally

[2]It is important to note that, this information is unpublished and not peer reviewed, it is based on reports and it demonstrates that there is no precise information regarding the status of the organic sector in South Africa.

includes farmers involved in farmer groups and contract farmers that produce pre-agreed volumes for specific distributors or retailers.

3.2.1.1 Private sector

The private sector producers may be divided into two categories:

- Commercial or large-scale farmers with single farms (traditional family farms)
- Smallholder farmers working together as a farmer group or under a common organic farming project.

3.2.1.2 Other organisations

As mentioned above, there are three main organisations that privately promote organic farming at national and grass-root levels. These organisations include Organic South Africa, Organic Freedom Project and the Biodynamic Agriculture Association of South Africa.

Organics South Africa

Organics South Africa (OSA) is a Section 21 Company (not-for-profit) founded in 1994 with the objectives of: "promoting and enhancing organic farming practices, increasing awareness of sustainable farming methods and assisting in the recognition of the natural relationship between soil, plant, animal and mankind" (INR, 2008). Organics South Africa aims to provide networks where members can share information and work together to develop the organic sector and to contribute to the sustainable management of its natural resources. Organics South Africa has members from various groups that include farmers, processors, meat producers, wine farmers, and the essential oil industry. Organics South Africa provides services such as (a) advice on the management aspects of organic farming, especially the management of soil, pest and diseases, (b) publication of business opportunities and (c) advice on certification (INR, 2008).

Organic Freedom Project

The Organic Freedom Project (OFP) is a Section 21 Company that works towards the promotion of commercially sustainable organic farming. The project has a developmental model which focuses on emerging farmers. Its goal is to identify and develop 20 000 ha of land. The project provides training in organic farming, mentorship and the transfer of skills (INR, 2008).

Biodynamic Agriculture Association of South Africa

The Biodynamic Agriculture Association of South Africa (BDAASA) is a non-profit voluntary association of Biodynamic farmers and people interested in Biodynamic Farming. The main institution is Bio-dynamics SA. It funds projects which further the objectives of BDAASA. The institution also has a Biodynamic and Organic Certification Authority (BDOCA), which inspects and certifies organic and biodynamic farms in South Africa. BDAASA is a member of OSA, IFOAM and SACODAS.

3.3 STRUCTURE AND IMPORTANT FEATURES OF THE INSTITUTIONAL ENVIRONMENT IN ORGANIC FARMING

This section describes the institutions that govern the organic farming industry and both global and local institutions are discussed. International institutions are addressed to highlight their importance to South African organic farmers because these institutions have an impact on farmers in the country. Organic standards, accreditation and regulations are reviewed.

3.3.1 Structure of Organic Standards and Certification

One of the many aspects that separate organic farming from other agricultural practices is its history of regulations. Compliance with the requirements to produce an organic product is known as certification. Organic farming upholds standards and regulations to preserve consumer confidence in organic products, and also encourages potential organic farmers. The regulation of organic products first arose because different geographical areas had their own evolving standards and certification methods. This became impractical because the different

standards and procedures were not directly comparable and the surfeit of various labels complicated the understanding of certified organic farming among partners (farmers, consumers and retailers) in the organic farming industry. Consequently, the IFOAM, governments and other non-governmental organisations developed organic standards and regulations. Thus, before a product can be labelled as organically produced, it must conform to these regulations (Lampkin, 1990). They monitor organic standards and regulations governing the production, processing and handling of organic products (Ponte, 2004).

In essence, a farmer producing any organic product may be certified by a public or private certification organisation. The following standards and procedures should be upheld: (a) the organic product is grown without the use of synthetic agro-chemicals for three years prior to certification; (b) the farmer keeps detailed records of methods and materials used in crop production and management plans; and (c) a third-party certifier annually inspects all methods and materials used on the farm (Ponte, 2004; Taylor & Force, 2006). Standards and regulations are developed by various institutions and are discussed below.

3.3.1.1 Standardisation, Accreditation and Regulation

Organic farming is centred on the commitment of farmers and processors to work according to set standards and regulations that define the organic production system. At the international level, there are two bodies that determine the direction of organic rules. The international Organisation for Standardisation (ISO) is the leading institution in developing standards that governments and other institutions adhere to, whilst, the International Accreditation Forum accredits institutions and governments that can offer certification to any firm. These are briefly discussed below.

International Organisation for Standardisation (ISO)

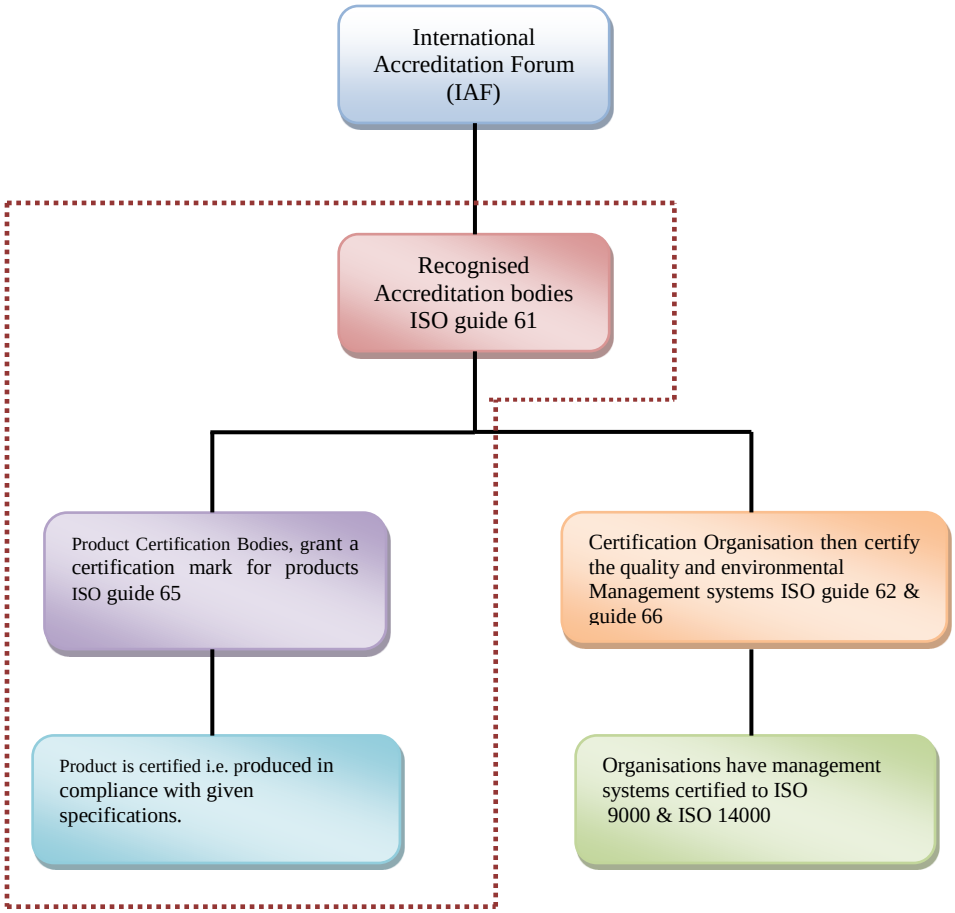
ISO is a non-governmental organisation that networks with national standards institutions from various nations to facilitate the global trade of goods and services and to develop cooperation in the areas of intellectual, scientific, technological and economic activity (INR, 2008). The organisation develops guidelines and standards. Guidelines are systems to which a

certification firm or accreditation institution adhere, while standards are systems and processes that need to be adhered to in order to be certified as compliant to a given standard (INR, 2008:35-40).

The International Accreditation Forum

The International Accreditation Forum, Inc. (IAF) is the world association of Conformity Assessment Accreditation Bodies (INR, 2008). The function of the IAF is to make sure that its accreditation body members only accredit competent institutions and to set up common recognition arrangements, known as Multilateral Recognition Arrangements (MLA), between its members (INR, 2008). Accreditation body membership of IAF is available to institutions that accredit bodies for certification/registration of products, management systems, services and programmes of conformity assessment.

The other function of IAF is to provide assurance of the equivalence of the operation of certification/registration bodies in nations with accreditation bodies that are members of the IAF and MLA (INR, 2008). Several countries have national accreditation systems that need to have a membership with the IAF. In South Africa, the South African National Accreditation System (SANAS) is the National Accreditation Body and it provides accreditation to institutions, which are competent to perform specific tasks in South Africa. SANAS accreditation includes accrediting and certification institutions, laboratories, Inspection Bodies, Proficiency Testing Scheme Providers and Good Laboratory Practice (GLP) test facilities (INR, 2008). Under organic certification, SANAS provides accreditation based on the ISO Guide 65 and Inspection Bodies are accredited to ISO/IEC/17020 standards (INR, 2008). Figure 3.1 illustrates the organisation of the standardisation systems under ISO. The level above the IAF is the ISO operation level and the dashed boundary shows the area that applies to organic certification.



Source: INR (2008)

Figure 3.1: Organisation of standardisation systems for ISO

International standards

Organic farming has two main international standards that are adhered to by governments and other institutions from the private sector. These standards include; the IFOAM and the *Codex Alimentarius* (usually known as "Codex").

IFOAM Standards

For several years, the IFOAM has developed a number of standards for organic farming that are usually known as Basic Standards and these are developed on a continuous basis. The IFOAM Basic Standards outline how organic products are produced, processed and handled (Huber, Schmid & Kilcher, 2009). It is important to note that these standards cannot be used

for certification on their own because they only provide a framework for independent certification institutions to develop their own national or regional standards (Ponte, 2004). For instance, the European Union standards were initially based on the IFOAM Basic Standards. South African standards have been based on the IFOAM Basic Standards.

The Codex Alimentarius

The Codex Alimentarius Commission is a joint FAO/WHO Food Standards Program, which was tasked to develop international food standards, guidelines and codes of practice in the food industry (Huber *et al.,* 2009). The Codex Alimentarius Commission has two committees, the Food Labelling committee and the Food Import and Export Inspection and Certification Systems committee which are responsible for developing guidelines for the production; processing, labelling and marketing of organically produced food (Ponte, 2004; INR, 2008). Although there are differences, the Codex Guidelines are generally in line with the IFOAM Basic Standards and the EU regulation for organic food (2092/91 and amendments, 1804/99) (Ponte, 2004).

3.3.1.2 International regulations[3]

There are several internationally recognised regulations such as the Australian regulation, European Union regulation, Japanese regulation and the United States of America regulation. For the purpose of this study, the discussion will focus only on the European Union regulation and that from the United States of America because South African organic farmers are usually certified by European or American certification organisations and export organic commodities to these regions.

European Union regulations (EU Regulation 2092/91)

The council regulation (EEC) 2092/91 is the regulation used in the European Union and it covers the marketing of products labelled as organic. The regulation also includes production standards and inspection measures that need to be implemented by European Union farmers

[3]This section draws heavily from Ponte(2004)

or importers to ensure the integrity of production. The council regulation highlights all the inputs that may be used in organic farming and it also recognizes the production methods that are authorized or forbidden (Ponte, 2004). There are three types of systems that approve the importation of organic products. These are: approval of the country, importer derogation, and approval of a certification institution (following a proposal of a member state). In practice, the importer derogation system implies that one organic product may be accepted when imported to one of the European Union member states and rejected when imported to another, nevertheless, once within the European Union border, it may be freely distributed (Ponte, 2004). Ponte explains that although this rule is based on the approval of individual organic products. The basis for its approval is strongly linked to the type of certification institution that approves the product.

United States of America regulations

The United States of America regulations on organic production are set out in the Organic Foods Production Act (OFPA) of 1990 and the National Organic Program (NOP) (Ponte, 2004). The regulation states that products produced from foreign countries and exported as organic to the United States of America (US) have to be certified and labelled in accordance with the U.S. regulation. Presently there are three ways of achieving compliance for importing organic products into the United States: direct accreditation by the United States Department of Agriculture, accreditation by a foreign government, and equivalency. Practically, direct accreditation by the USDA is the most important one (Ponte, 2004).

3.3.2 The South African Regulatory environment for Organic farming

South African organic farming standard

The South African organic standard is currently in draft form and the National Department of Agriculture, Forestry and Fisheries is developing it. This standard is in line with the IFOAM Basic Standards, the *Codex Alimentarius* and the European Union regulations. Currently, it is in its eighth draft. The stage for public comment is now over and it is awaiting approval from the National Department of Agriculture. After this, it will be vetted by the World Trade

Organisation (WTO) (INR, 2008). The process of developing this standard has been specifically undertaken by the Directorate: Food Safety and Quality Assurance of the National Department of Agriculture which is responsible for controlling the quality of agricultural produce and management systems used in the agricultural sector under the Agricultural Products Standards Act (Act 119 of 1990) (INR, 2008).

South African organic farming policy

The South African organic farming sector is not specifically regulated by any policy because there is no legislation that applies exclusively to organic production. However, organic farming as a subset of agriculture is subject to any agricultural regulations in South Africa, for instance, the Agricultural and Stock Remedies Act (No 36 of 1947) regulate the regulation that controls the use of fertilisers, farm feeds and other agricultural inputs. This implies that organic farmers in South Africa can only use organic inputs that are registered in the country. This, however, conflicts with some processors who have suggested that a separate registration code be developed for organic inputs, in line with development of the South African organic standard (INR, 2008).

The IFOAM Basic Standards and the Codex through foreign certifiers who adhere to the IFOAM and Codex also regulate South African organic products. The Perishable Products Export Control Board (PPECB) further regulates organic products in terms of exporting organic products. The board regulates the authenticity of organic claims by requiring a certificate, which is usually provided by the organic certifying institution, and has to be accepted in the country of the product destination. The absence of an organic regulation is a constraint to farmers and processors (INR, 2008).

3.4 ORGANIC CERTIFICATION

Organic certification is vital to organic farming because it acts as a communication tool between consumers and farmers.

3.4.1 Definition, purpose and institutionalisation of organic certification

Certification is a process or procedure for confirming that a product or service conforms to certain standards (Dorr & Grote, 2009). Certification is mainly a form of recognition that products do comply with organic production standards. In essence, certification is whereby a third party gives written assurance that a product, process or service is in compliance with the required standards (Danker, 2003). Blackman and Rivera (2010) explain that certification is regarded as a form of communication along a product supply chain and it is provided without a direct interest in the economic relationship between the supplier and buyer. Armstrong (2003) in support of this also explains that certification usually demonstrates to the buyer that the supplier does comply with the given standards. This is more convincing to the consumer than if the supplier provides the assurance to a consumer.

In comparison with the above definitions of certification, IFOAM (2003) uses the following definition for organic certification. "The procedure by which a third party gives written assurance that a clearly identified process has been methodically assessed, such that adequate confidence is provided that specified products conform to specified requirements".

Institutionalisation of certification formed four different approaches which are classified as: first-party certification, second-party certification, third-party certification and fourth-party certification; and participatory guarantee systems. First party certification characterises the early phases of organic trade and refers to the first pioneers who classified the first organic criteria and performed peer reviews in their groups. Fonseca (2004) explains that second party certification is when the firm marketing a given product sets and controls its standards. As an example, González and Nigh (2005) describe how Starbucks's criteria for their consumer preferences is regarded as vital to the firm's identity and marketing. Third party certification is common in organic certification. This is when individual farmers obtain certification from independent certification firms. An example of third party certification is also group certification that has recently been introduced to reduce certification costs especially in smallholder farmers (Fonseca, 2004).

Fourth party certification is characterised by how the International Standards Organisation (ISO) and IFOAM work to harmonise global standards to make certification and trade feasible for several firms (González & Nigh, 2005). Finally, participatory certification, also known as Participatory Guarantee Systems (PGSs), is the recent alternative option through which one can obtain organic certification and it is based on co-responsibility of a social network of members which can include farmers, consumers, researchers or other committed stakeholders (Fonseca, 2004).

In particular, organic certification was first institutionalised in 1970 as a voluntary activity, where farmers inspected themselves on a voluntary basis (INR, 2008). IFOAM (2006) indicates that the need for organic certification is increasing as several governments require certification labels. This is because producers (farmers) market and trade their organic products in different geographical areas. In an agricultural and food industry setting, organic certification is applied to all kinds of food products (juices, cereals, and grains, including rice, and even alcoholic beverages, such as wine, sugar, meat, dairy products, and eggs) produced under strict regulation and guidelines. IFOAM (2006) states that institutionalised organic certification is based on the following principles[4]:

- Institutional separation of extension services and inspection/certification;
- Four-eyes principle: personal separation of inspection of operations and certification within certification body; and
- A process based system unlike product oriented inspection from primary production to product marketing.

Organic farming differentiates itself from other concepts of sustainable farming through such principles that guide the accomplishment of certification requirements. Organic certification serves two purposes. First, it informs consumers that a product was grown, processed and packed according to the rules that limit synthetic inputs. Secondly, it makes the organic market more efficient by limiting asymmetric information along marketing channels (Lohr, 1998).

[4]These principles are found in the IFOAM's basic norms, the international ISO norm EN

3.4.2 What certification mechanisms are employed in South Africa?

In this section, the discussion focuses on the alternative certification schemes used under organic certification. Two distinct schemes are reviewed which are commonly used in South Africa. Organic certification is a formal and highly structured system for ensuring the reliability of organic claims. Certification is important particularly for farmers that trade outside their geographical borders and requires that farmers have appropriate systems in place to ensure that proper records are set aside and all the requirements for a particular organic regulation are adhered to. In developing countries such as South Africa, this structure of certification is costly for smallholder farmers because it necessitates high inputs costs. As a result, the IFOAM created two alternative models. The first model is the group certification model, which is still under the third party certification system, and the second one is the participatory guarantee system that is a first party certification model.

a) Group certification scheme (with internal control system)

The Group certification scheme is a scheme recognized by IFOAM that supports the certification of smallholder farmers. The scheme enables certification of organized groups of farmers that are able to collectively manage the production, processing, handling and/or marketing of their organic produce. These farmer groups are in the form of farmer organizations or farmer cooperatives. Under the group certification scheme, there is a fundamental aspect, the Internal Control System (ICS). The ICS is set up as a means to ensure compliance to organic standards and requirements (Kalus, 2004). It allows farmers to obtain certification in a group as a whole. It does not require the individual certification of each farmer.

The ICS is part of the documented quality assurance system that allows an external certification body to entrust the periodic inspection of individual group members to an identified body or unit within the group according to Willer *et al.* (2009). It is set up in a way that farmers audit each other or involve a third party certification institution that inspects the functioning of the system, as well as to perform spot-check re-inspections of individual farmers. By choosing from a random sampling of farmers, an external inspector verifies

whether the ICS is established and evaluates its effectiveness and functionality. Members of the farmer group are then certified collectively (Willer *et al.*, 2009; IFOAM, 2006). With a well-functioning ICS, this type of certification model reduces certification and inspection costs (Willer *et al.*, 2009).

b) Participatory Guarantee System

The IFOAM defines participatory guarantee systems as a "locally focused quality assurance system that certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange" (INR, 2008). The PGS is analysed as an alternative certification scheme to third party certification because it relies on the active participation of smallholder farmers, agro-processors, traders, researchers and consumers during the certification process. It is a first party certification whereby a group of farmers uphold a set of documented standards (IFOAM, 2006). All parties involved participate in the development and implementation of organic standards and verification procedures (Fonseca, 2004). The scheme strongly relies on the element of trust and social conformity to adhere to the quality assurance system. Trust is built through face-to-face interactions between stakeholders, and certification procedures are made as transparent as possible (Fonseca, 2004). The procedures and standards of the PGS are generally based on the IFOAM, *Codex Alimentarius* (FAO, 1999) or the nation's regulations. PGS is not a common system in South Africa, as most smallholder organic farmers tend to opt for the group certification scheme. A possible reason may be that South Africa with its well-established organic market has international certifiers that provide third party certification for individual farmers as well as smallholder farmer groups. On the contrary, countries such as Brazil, Mexico and Argentina prefer the PGS system due to the limitations of a common organic third-party certification.

Both of these options have benefits and drawback. For a group certification scheme, farmers pay reduced annual certification costs to the certifier and are guaranteed to access both local and international markets. The drawback of the group scheme is that often the control system is not respected and some farmers from the study area reported incidences where farmers use

unauthorised chemicals on their farms but cannot be penalised because of close ties with the group.

3.4.3 Who carries out Organic Certification in South Africa?

As South Africa has no regulation on organic farming, it implies that there is no government or public supported certification system in place. International and private domestic certification firms primarily carry out certification of organic farms. Waarts, Bakker, Snels and Danse (2009) explain that there are five organic certification firms in South Africa, which are as follows:

- Biodynamic and Organic Certification Authority (BDOCA), which has a partnership with Debioa a firm from Norway;
- Afrisco-Ecocert, has a partnership with the French certification firm (Ecocert), so for farmer intending to export to Europe are easily certified;
- Soil Association certification ltd, is a certification firm from the United Kingdom;
- Control Union (CUC), has a partnership with the Dutch certification organisation. SKAL; and
- SGS is a local certification firm for South Africa (Waarts *et al.*, 2009).

Waarts *et al.*, (2009) explain that each of these firms has a different certification fee. These fees are determined by the cost of transporting inspectors from abroad for farmers that intend to export their goods. For instance, when a farmer requires to be certified based on ISO 65 certification, this increases the cost of certification. In South Africa, organic certification fees range from R3 000 to R6 000 a year for obtaining individual and group third party certification (Waarts *et al.*, 2009).

3.4.4 How is Organic Certification carried out in South Africa? The organic certification process– a two stage process

Certification has valuable marketing implications as it authenticates claims of inorganic products. In South Africa, the process of certification involves two important stages; registering for certification and inspection by a third party certifier.

Registering for certification

The process of certification begins when a farmer selects a specific certification firm. This decision is based on the farmer's intentions of either using export markets, local markets or the nature of organic standards for the firm and the costs. As soon as a certification firm is selected, a questionnaire and organic production standards document must be completed. These documents are used for water and soil sampling. The questionnaire examines the farmer's specific situation. After completion of the questionnaire, the certification authority provides a proposition laying out particulars of the audit process, costs involved and obligations of the applicant. A pre-requisite for registering for organic certification is an organic management plan, soil and water analyses, maps and a spraying program.

Inspection visit

The first inspection visit incorporates a thorough audit of the farm's processing equipment, storage areas, bookkeeping, labels and general administration records. Cropping and rotation plans; acreage per crop and a three year recorded history of each farm is required. The latter includes information about previous crops, use of fertilizers, herbicides, pesticides and fungicides; the origin of seed and plant material; methods of weed, pest and disease control as well as records of fertilizers and sprays used on conventional vines in the vicinity of those being assessed. Storage facilities, bookkeeping and record keeping of farming processes are also inspected. Then, six months after the first inspection a follow up audit takes place. The audit report monitors the farm's progress and sees whether the corrective action stipulated at registration was implemented. Depending on previous production, the farm may be classified

as ‘organic in conversion’ immediately or after the first year. It generally takes at least another two years before full organic certification is granted.

3.4.5 Challenges in Organic Certification - South Africa

The conclusions presented below are primarily based on statements from respondents visited during the survey. These aim to outline the main challenges encountered by organic farmers and processors during the organic certification process. In the process of achieving organic certification, farmers are challenged with issues such as the processing of organic and conventional products in separation, the production mobility of contracted farmers and product traceability.

Processing of organic and conventional produce

A pack house for vegetables and fruits in Limpopo uses the same storage facilities for organic and conventional products. There is no clear standard of operating procedures to verify the statement made during the visit that there was a clear separation of products.

Product Traceability

Most farmers had good on-farm operating records but some processors explained that they could not expect local contract farmers to record their on-farm operations. One given pack house did not have clear product traceability tags or labels, but trusted on knowing that just one delivery truck had delivered products from a known outlying production base.

Production mobility of contracted farmers

The organic processors visited had a challenge with the high production mobility of contracted farmers. Most organic farmers shift their production between farming seasons and do not specialise in a given organic product. Therefore, this creates a risk that the contracted farmer may not be compliant with the given organic standards.

3.4.6 An overview of organic certification amongst smallholder organic farmers in South Africa

In the South African context, organic certification amongst smallholder organic farmers is usually obtained through either a farmer group or farmer cooperative. Non-government organisations such as AFRISCO play a vital role in promoting organic farming among smallholder farmers by providing training with non-remunerated guidance on the principle of organic production and certification (Kisaka Lwayo, 2012). Farmers form standardising rules for an internal control system (ICS). The reason for creating an ICS is normally to reduce the annual certification cost. According to IFOAM (2003), smallholder organic farmers have to form a group which then provides information about the description of the operator and the type of the producer organisation. Smallholder farming units do have an identifiable administrative system that also have a relationship with the group's central administration (Kisaka Lwayo, 2012).

In Limpopo Province, the role of government has been significant in providing organic production management training and providing some infrastructure such as dripping systems for potential smallholder organic farmers. Smallholder organic farmers and their cooperatives have taken advantage of government programmes whereby they receive technical support to implement the changes necessary to shift to organic farming. However, government policies and agencies have played a marginal role or rather no role in providing financial support such as subsidising the annual certification and inspection fees for farmers. The onus is upon a farmer to obtain and implement certification requirements and, thus, it is as stated previously an investment decision for a farmer to precede and certify their farm. Studies from other developing countries have reported that such fees create a barrier for farmers to certify their farms (Barrett *et al.*, 2001). While evidence suggests that there are no specific policies to support smallholder organic farmers financially, it is important that government financially support the development of emerging organic farmers. Non-governmental organisations (NGOs) have also played an influential role in the emergence of smallholder organic farmers, usually by promoting alternative models of organic production among farmers. Many of these (NGOs) provide technical support and information with regard to market access.

3.5 SUMMARY

Chapter Three presented an analysis of the organic farming industry in South Africa. Furthermore, the chapter also presents the structure and important features of institutions under organic farming and certification. These are vital for the South African organic sector since South Africa relies on international regulations and foreign certifiers to adhere to organic certification requirements. Challenges in organic farming and certification are discussed. An overview of organic certification among smallholder organic farmers is presented.

CHAPTER 4: A MODEL OF FARMERS' PARTICIPATION IN CERTIFIED ORGANIC FARMING

4.1 INTRODUCTION

The purpose of this study is to investigate the determinants affecting the low participation of smallholder organic farmers in certified organic farming and to highlight its economic benefits, which are not clearly defined. In Chapter Six, a model that identifies the marginal effects of these factors, will be examined. Several researchers have recognised that one cannot analyse smallholder farmer participation in commercially driven agricultural enterprises by using standard economic models. Conceptual, theoretical and empirical models are required to understand the behaviour of smallholder farmers in such enterprises. Thus, the objective of this chapter is to show the conditions under which a farmer can participate in certified organic production. It is an empirical research chapter and it tries to answer the following two questions:

1. What economic conditions can enable a farmer to maximise their utility under certified organic production?
2. Can farmers proceed with production with the identified conditions?

The first and second sections present a conceptual and theoretical model of farmer participation in certified organic farming as a commercial agricultural enterprise. The final section provides a summary of the chapter.

4.2 THE CONCEPTUAL FRAMEWORK

In order to categorize the determinants for farmer participation under certified organic farming, a conceptual framework for analysing farmers' decision making towards certified organic farming is presented in Figure 4.1. This conceptual framework incorporates factors such as the certification structure, market prices and access. These factors may affect farmers' decisions concerning their participation in such commercial enterprises. The justification of using this conceptual lies in the ability to capture salient factors which may

not be influenced by government or NGO's but more by the market since farmers are price takers. The framework is adapted from a model described by Vanslembrouck, Huylenbroeck and Verbeke (2005) to analyse the determinants of farmers to participate in agri-environmental measures. In this conceptual framework, it is hypothesised that farmers' decisions to participate are influenced by both certification and market characteristics, as well as farm and farmer characteristics since these farmers are well trained in certification and its procedures and take such decisions based solely on investment purposes.

Certification characteristics that influence farmers' participation are, for example, the required changes in the farming practice, certification costs and benefits. Market related characteristics refer to prices of certified organic commodities. Farm and farmer characteristics are divided into land ownership, farm size and age, gender, education level and income.

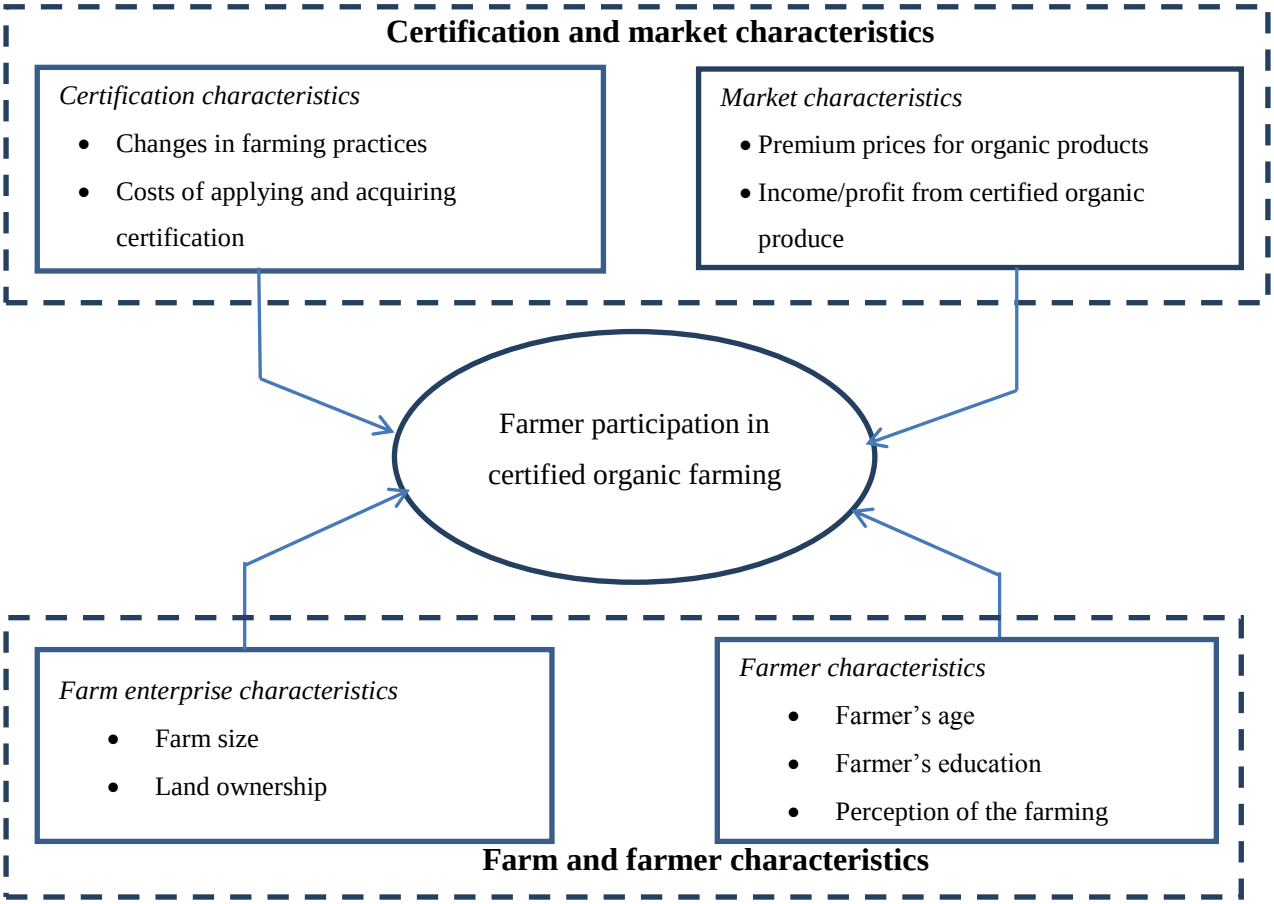


Figure 4.1: Conceptual model of farmers' decision to participate in certified organic farming (adapted from Vanslembrouck et al)

4.3 THEORETICAL MODEL

Analysing farmers' participation in certified organic farming is relatively a new research area. Previous studies have mainly focused on farmers' participation in agri-environmental schemes, economics of farmer participation in farm and resource management programs and market participation (Makhura, Kirsten & Delgado, 2004; Ma, Swinton, Lupi & Jolejole-Foreman, 2012; Vanslembrouck *et al.*, 2005; and Wollni, Lee & Thies, 2010). Some of these studies are based on actual observation and contingent data, and conclude that uptake or participation is a function of a number of transaction costs, farm and farmer and market characteristics.

In the case of certified organic farming, this study will also test the above-mentioned characteristics as explored by previous studies, but will also include requirements and other aspects related to certification. To test this, the theoretical model that will identify determinants of farmer participation under certified organic farming follows largely on the recent work by Vanslembrouck *et al.* (2005), Wollni *et al.* (2010) and Ma *et al.* (2012). Their models are based on participation in program initiatives. In constructing the theoretical model, components of farmer utility maximisation from Vanslembrouck *et al.* (2005) are mostly used.

4.3.1 Farmer participation with or without certification

Founded on economic theory, farmers will always prefer to participate in a new initiative if it maximises their profit even if subject to their constraints (Bekele, 2006). Following Vanslembrouck *et al.* (2005) and Ma *et al.* (2012), we consider a farm household maximising utility (U) which depends on the production of either non-certified organic products or certified organic products and leads to a farm income (I) for non-certified products, and, Q_E for certified organic products. The output can be produced based on a given set of allocated variable inputs (X) and fixed inputs (Z). An assumption that a minimum level of certified organic commodities are produced in order to obtain a price premium (P_E) and a threshold of $\bar{Q}_E$ could be higher than what the farmer would otherwise expect seasonally. Therefore, there are two models to compare: (a) with and (b) without certification.

(a) In the first case of a farmer farming with certification, a farmers' maximisation problem is:

If $Q_E = g(X_E, Z) \geq \bar{Q}_E$ the farmer solves

$$\max_{X_E X_F} U(I, Q_E)$$

$$s.t\ I \leq P_F'f(X_F, Z) + P_E'Q_E - w(X_E + X_F) - r'Z \qquad 4.1$$

$X_E \geq 0$, otherwise the farmer cannot receive P_E

where; U, f, and g are increasing concave functions, X_F is the variable input allocated to non-certified organic produce; X_E is the variable input allocated to certified organic produce; Z is the fixed input factors; P_F is the price vector of non-certified organic produce; P_E the premium price for certified organic produce; w is the input price vector; and r the unit cost of the fixed input ($r'Z$ mentioned in equation 4.1 is what a farmer pays every year for certification related costs).

The challenge with smallholder organic farmers is to choose the input level of either X_E or X_F that maximises their utility under the assumption that income is obtained by either non-certified organic produce or participation in certified organic farming that has high premiums but also has high certification related costs. The Kuhn-Tucker conditions are given by the equation(4.2), with λ being Lagrange multipliers associated with the constraint on the production of certified organic produce (Vanslembrouck *et al*., 2005).

$$\frac{U}{X_F} = U_I(P_F f(X_F, Z) - w) = 0 \qquad 4.2$$

$$\frac{U}{X_E} = U_{Q_E}\mathrm{g}(X_E, Z) + U_I(P_E \mathrm{g}(X_E, Z) - w) \leq 0; X_E \ \ 0 \qquad 4.3$$

$$X_E\left(U_{Q_E}\mathrm{g}(X_E, Z) + U_I(P_E \mathrm{g}(X_E, Z) - w)\right) = 0$$

The farmer has a free choice to use an input related to certification and it is separable from the farmers' preference in 4.2. Therefore, equation 4.3 results in,

$$U_{Q_E}\mathrm{g}(X_E, Z) + U_I(P_E \mathrm{g}(X_E, Z) - w) = 0 \qquad 4.4$$

Implying that;

$$w = \left(P_E + \frac{U_{Q_E}}{U_I}\right) \mathrm{g}(X_E, Z) \qquad 4.5$$

Equation 4.5 implies that a farmer uses certification as an input up to the point where the unit cost of certification is equal to the sum of the value of its marginal product and marginal rate of substitution between producing non-certified products and certified products. Most certified organic farming requires a change in the production and marketing practices i.e. no use of pesticides, change in irrigation systems and packaging facilities for the market. So the substitution between non-certified production and certified production for every input *k* involved in certified organic farming and non-certified organic farming is given by:

$$w_k = \left(\frac{U_{Q_E}}{U_I} + P_E\right)\frac{\mathrm{g}(X_k)}{X_k} = P_F \frac{f(X_k)}{X_k} \rightarrow \frac{\frac{\mathrm{g}(X_k)}{X_k}}{\frac{f(X_k)}{X_k}} = \frac{P_F}{\left(\frac{U_{Q_E}}{U_k} + P_E\right)} \qquad 4.6$$

The following conditions, explain the participation in certified organic farming, and result from equation 4.6:

i. If non-certified organic farmers manage to obtain higher prices for their non-certified organic produce, a lower rate of participation in certified organic farming shall be noticed because farmers will be using lower production costs;
ii. The higher the premium prices for certified organic products (P_E), the more farmers are inclined to participate in certified organic farming; and
iii. The lower the costs (requirement for certified organic farming), the higher the probability that farmers will participate in certified organic farming; as lower input costs make certified organic farming more attractive.

In summary, we conclude that the participation of farmers in certified organic farming will be higher, if certified organic farming provided lower costs of inputs, which leads to a higher utility for the farmer in the long run. A derivation of the Kuhn-Tucker conditions in 4.2 provides an explanation of participation choice of the farmer, which is a discrete choice problem:

$$w\left(\frac{U_{Q_E}}{U_I}+P_E\right)\frac{g(X_E)}{X_E}\text{and}X_E\left[w-\left(\frac{U_{Q_E}}{U_I}+P_E\right)\frac{g(X_E)}{X_E}\right]=0$$

$$\text{If}\quad X_E>0\ \text{then}\ w=\left(\frac{U_{Q_E}}{U_I}+P_E\right)\frac{g(X_E)}{X_E} \qquad 4.7$$

$$\text{If}\quad w>\frac{U_{Q_E}}{U_I}+P_E\Big)\frac{\partial \text{g}(X_E)}{X_E}\leftrightarrow P_E<\frac{w-\frac{U_{Q_E}g(X_E)}{U_I\quad X_E}}{\frac{g(X_E)}{X_E}}\ \text{then}X_E=0 \qquad 4.8$$

From condition 4.8, it can be derived that if the premium price (P_E) for certified organic products is lower than the marginal cost of any input related to certified organic farming minus the marginal utility of the certified organic production then the farmer will not participate in certified organic farming. If it is higher X_E> 0 (condition 4.7), then the farmer will participate and increase inputs dedicated to certified organic farming until its marginal cost equals the marginal revenue plus the marginal utility from producing certified commodities.

b) In the second case of non-certified organic farming, if $Q_E{}^* = \text{g}(X_E{}^*, Z) < \bar{Q}_E$ then the farmer will not receive P_E and has to solve the following optimisation problem as follows:

$$\max_{X_E\,X_F} U\,(I, Q_E)$$

$$s.t\ I \le P_F{}'f(X_F, Z) - w'(X_E + X_F) - r'Z \qquad 4.9$$

$$\text{and}\ Q_E = \text{g}(X_E, Z)$$
$$X_E \quad 0$$

In this case:

$$\text{If}\quad w>\left(\frac{U_{Q_E}}{U_I}\right)\frac{g(X_E,Z)}{X_E}\text{then}(X_E{}^*=0) \qquad 4.10$$

$$\text{Or if}\ X_E{}^*>0\ \text{then}\ w=\left(\frac{U_{Q_E}}{U_I}\right)\frac{g(X_E,Z)}{X_E} \qquad 4.11$$

The theoretical model confirms that farmer participation shall indeed depend on certification related inputs and market prices for organic commodities, as these will influence the terms $\delta f(X_k)$ and $\delta \text{g}(X_k)$, and also certification related inputs such as certification cost, inspection costs and changes in production practices. Thus, a farmer participation model depends largely

on certification as an input cost and the ability of the farmer to access the required market prices. Chapter Six estimates the econometric model for farmer participation with its subsequent factors.

4.4 SUMMARY

This chapter introduced the conceptual framework for analysing the determinants of farmer participation under certified organic farming by smallholder organic farmers. The framework identified conditions under which an organic farmer is anticipated to participate in certified organic farming. Because farmers produce and consume resources simultaneously, a utility maximisation problem is applied in the decision to produce, consume and sell their products. Producing certified organic commodities, the aspect of market prices, costs of certification and farmer and farm characteristics subsequently determine participation.

A farmer is faced with a challenge to decide whether to apply a certification production or not. In a certified production, the farmer is able to access international commodity markets and obtain a premium price for their product; however, certification related costs influence the farmer's decision to participate or not to participate. When the farmer has selected a certified production, chances are that he/she may substitute to a non-certified production if he/she gets to a point where the unit cost of certification is equal to the value of its marginal product and marginal rate of substitution. Non-certified producers can access local markets, with lower rated market prices but do not incur certification related costs.

Selection of a certified organic production may not necessarily depend only on market and certification characteristics. The econometric model in Chapter Six will show a specification of farmer participation under certified organic farming with explanatory variables that encompass farm, farmer, certification and market related characteristics. In the next section, Chapter Five, presents and discusses the characteristics of organic producers.

CHAPTER 5: CHARACTERISTICS OF SMALLHOLDER ORGANIC PRODUCERS IN LIMPOPO PROVINCE

5.1 INTRODUCTION

The previous chapter has shown the economic conditions under which an organic farmer is expected to participate in certified organic farming. Some empirical studies, however, have found that the specific market structure, information access, the role of government and non-governmental organisation, farm and farmer characteristics contribute to farmer participation under organic farming. The empirical model for this study requires information about farmer participation as well as sources of such determinants that might be resulting from socio-economic and demographic characteristics (which cover farm and farmer characteristics).

The objective of Chapter Five is then to establish empirically the characteristics of smallholder organic producers in order to identify variables for the specification of the model in Chapter Six. The demographic and socio-economic characteristics are discussed in the first section. Then, the commercial orientation of both certified and non-certified farmers is presented, giving a breakdown of farm characteristics. The third section discusses factors of information access to organic production. The final section provides a summary of the chapter.

5.2 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS

The circumstances of farmers living in the rural areas are to a considerable extent reflected in the socio-economic factors, which, in turn influence farmers' economic behaviour. This section discusses the demographic and socio-economic characteristics of smallholder organic farmers in the study area. The section is divided into two subsections. The first subsection provides the demographic characteristics of organic farmers. The second subsection discusses the socio-economic characteristics that include farmers' sources of income and asset distribution. All these variables are presented in table form that shows clearly the difference between certified and non-certified organic producers. Some of the noticeable statistics are provided in Appendix One. Under normal circumstances, the demographic distribution of

farmers influences their behaviours. This part of the chapter gives a broader view of the socio demographic characteristics of farmers. These are age, gender and level of education.

5.2.1 Age distribution

The age of the farmer is one of the important factors in the agricultural sector since some scholars use it as a proxy to determine the experience and interest of a farmer (Chambers and Foster, 1983). The variable, age, was grouped into five levels (<30, 31 – 40, 41 – 50, 51 – 60 and >60), and, the analysis tries to answer the question; are there differences between the age of certified organic farmers and non-certified producers? Table 5.1 shows there is a difference between the two groups and it shows that older farmers are certified organic producers. The average age of farmers was 45 years indicating that the majority of farmers are middle aged and therefore are still in their active years. One of the reasons that can account for this age pattern might be that at 45 years, some respondents do consider organic farming as a lucrative income generating activity.

Table 5.1: Age distribution of farmers

Age of a farmer		Organic Production		Share of total age group
		Certified participants n=54	*Non-certified participants n=18*	
<30	Count	2	0	2
	% within Organic Production	3.7%	0.0%	2.8%
31-40	Count	12	2	14
	% within Organic Production	22.2%	11.1%	19.4%
41-50	Count	24	8	32
	% within Organic Production	44.4%	44.4%	44.4%
51-60	Count	7	4	11
	% within Organic Production	13.0%	22.2%	15.3%
>60	Count	9	4	13
	% within Organic Production	16.7%	22.2%	18.1%
Total	Count	54	18	72
	% within Organic Production	100.0%	100.0%	100.0%

Source: Survey Data, 2010

18 per cent of the sample group are farmers older than sixty, and the proportion of farmers between 51 – 60 years is very similar (15%). Finally, only 3 per cent of farmers are below thirty years of age. The reason for the low numbers of young respondents involved in farming could be that young people migrate to urban areas to seek better employment opportunities and do not consider farming as a potential income generating activity. The existing culture in the young people is to complete tertiary education and seek employment. Economically active farmers are between 41 and 50 years, constituting almost 44 per cent of the sample population. This figure includes both certified and non-certified producers. The proportion of economically certified producers in this group is 33 per cent. The other group of farmers with a relatively high proportion are between 31 and 40 years of age (19%).

5.2.2 Gender of farmers

The male to female ratio is largely evident in this sample population. Gender distribution reveals that there are more female-headed farms (61%) than male-headed farm holdings (39%). The 2001 census results for areas surveyed indicate a closely similar distribution (55% = female and 45% = male); this phenomenon is aggravated by the continuous search for urban income generating activities. Culturally, women remain at home while men go out to seek employment in urban areas. This leaves the responsibility of taking care of farms to women. This finding is supported by Doss and McDonald (1999) who explain that women are responsible for at least 70 per cent of farming activities in almost all communities in Africa. Table 5.2 shows the gender distribution of the surveyed organic farmers.

Table 5.2: Gender of organic farmers

Gender of the farmer		Organic Production		Share of the gender group
		Certified participants n=54	*Non-certified participants n=18*	
Male	Count	21	7	28
	% within Organic Production	38.9%	38.9%	38.9%
Female	Count	33	11	44
	% within Organic Production	61.1%	61.1%	61.1%
Total	Count	54	18	72
	% within Organic Production	100.0%	100.0%	100.0%

Source: Survey Data, 2010

Amongst the female producers, 46% participate in certified organic production and 15 per cent of them are not certified organic producers. In the male group, 29 per cent are certified organic producers and 10 per cent are not. The difference between men and women involved in certified organic farming may be attributed to the cultural norms and the increasing attention to women participation in commercial agriculture in South Africa.

5.2.3 Education

Education is one of the essential aspects that can enable a farmer to understand basic farm management, agricultural marketing principles and the ability to create business networks. In other words, education increases the competence of a farmer in generating income. The variable education was grouped into six levels (no education, primary education, secondary education, certificate, diploma and other - degree). The minimum level of education was one (no education) and the maximum level of education was six (other – for instance a degree). A higher education level is associated with more knowledge and skill to access and utilise information. In most cases, farmers with an education level higher than secondary can easily understand the dynamics of farming for income purposes other than those with primary education only, unless otherwise. Table 5.3 presents percentages of each category.

Table 5.3: Education level of organic producers

Education level		**Organic Production**		**Share of the education group**
		Certified participants n=54	*Non-certified participants n=18*	
No education	Count	11	3	14
	% within Organic Production	20.4%	16.7%	19.4%
Primary education	Count	21	6	27
	% within Organic Production	38.9%	33.3%	37.5%
Secondary education	Count	12	4	16
	% within Organic Production	22.2%	22.2%	22.2%
Certificate	Count	7	4	11
	% within Organic Production	13.0%	22.2%	15.3%
Diploma	Count	2	1	3
	% within Organic Production	3.7%	5.6%	4.2%
Other-degree	Count	1	0	1
	% within Organic Production	1.9%	0.0%	1.4%
Total	Count	54	18	72
	% within Organic Production	100.0%	100.0%	100.0%

Source: Survey Data, 2010

In addition to this, most farmers (38%) from the sample attained a primary level of education and 22 per cent of respondents had a secondary level of education while 19 per cent of the respondents did not have any form of education. 15 per cent of the respondents attained a certificate level of education. Education has been found to create a favourable attitude for the acceptance of new agricultural practices especially those that are information and management based (Caswell, Fuglie, Ingram, Jans & Kascak, 2001). A study by Adesina and Zinnah (1992) also suggested that education contributed to farmer's awareness of new aspects and thus favours their uptake of new farming practices. The standard deviation of the overall variable of education is 0.496. The low levels of education amongst farmers are a deterrent to respond to opportunities such as improved methods of farming, commercial production such as certified organic farming. More so, this may render farmers less competitive which later affects farmers' ability to participate in commercially driven initiatives. Table 5.4 illustrates the mean and standard deviation of farmers.

Table 5.4: Farmers' education level

Education level	N	Percentage	Mean	Standard Deviation
No education	14	19.4	1.21	0.426
Primary education	27	37.5	1.22	0.424
Secondary education	16	22.2	1.25	0.447
Certificate	11	15.3	1.36	0.505
Diploma	3	4.2	1.33	0.577
Other-degree	1	1.4	1.00	0.000
$\chi^2 = 37$, df = 5, *p* value = 0.000				

Source: Survey Data, 2010

With regard to socio-economic characteristics, farmers were assessed on aspects such as their sources of income, farming experience, farm size, and type of land ownership, asset distribution and access to information. Table 5.5 shows a summary of statistics of socio-economic variables.

Table 5.5: Statistics of socio-economic variables

Socio-economic variables	t value	Degrees of freedom	P value	Mean Difference
Farmer Experience	27.13	71	0.000	4.94
Average Income	22.34	71	0.000	874.38
Farm size	19.19	71	0.000	2.68
Land ownership	23.95	71	0.000	1.29

Source: Survey Data, 2010

5.2.4 Farmers' income and occupation

In order to have a clear view of the economic setting of farmers, this section presents the different sources of income for the surveyed farmers. The main sources of income are wages, social grants (in form of pensions) and farm income; each source is discussed. Appendix One provides a summary of sources of farmers' income and their distribution. Table 5.6 below provides a distribution of major sources of income for organic farmers.

Table 5.6: Major sources of income for organic farmers

Main sources of income	*Certified producers n=54*	*Non-certified producers n=18*	Total %
Farm income	42%	12%	54%
Social grants	19%	3%	22%
Wages	14%	10%	24%
$\chi^2 = 14.08$, df = 2, *p* value = 0.001			

Source: Survey Data, 2010

Farm income consists of income generated from the sale of farm produce. Forty two per cent of farmers obtained their farm income from contracted markets and also local grocery stores, hawkers and vendors. Non-certified farmers (12%) expressed concern regarding retailers who do not provide payment after they supply their produce and this was because such farmers do not hold formal contracts with retailers. As a result, most of the non-certified producers, sell their produce to vendors, hawkers and local hotels and restaurants that usually fetch lower revenues compared to certified producers. The average farm income for a certified producer per season is R6 790 compared to R3430 from non-certified producers.

Wages from formal employment were the second highest proportion of farmers' income, namely 24% (Table 5.6). Farmers that had formal employment included teachers, extension officers, clerks and those working in the provincial department of agriculture. Social grants represented 22 per cent of farmers' sources of income. A significant proportion of certified producers (19%) do receive grant related income in the form of pensions, veteran grants and grants for older individuals. All sources of income variables are well distributed and independent of each other with a chi square of 14 and a *p* value of 0.001.

In terms of occupational distribution of respondents, farming is the highest employer of labour (48%); this is closely followed by formal employment (24%) while others are engaged in the informal sector. More so, respondents' distribution by secondary occupation reveals that even for those farmers who are engaged in non-farm activities as their primary occupation, a significant number still rely on farming (56%) as their secondary income source. It implies that farming is still the most supported activity in the study area.

5.2.5 Farming experience

Farmer experience in organic farming is regarded as one of the fundamental factors to encourage farmers to participate in certified organic farming. The variable farming experience was categorised into six categories from one year of farming experience to greater than five years. 60percent of farmers had at least five years or more experience in organic farming. This suggests that most farmers regarded organic farming as their daily economic activity. The mean farming experience was found to be five years (SD = 1.51) implying that there was a good variation in the years of farming experience. Nevertheless, the span of experience in farming is probably an indicator of a farmer's commitment to organic farming. It may not necessary predispose the farmer to participate in certified organic farming. However, it is more coherent to expect a more experienced farmer to be more receptive to certified organic farming. Table 5.7 shows the descriptive statistics for the variable farmer's experience. Farming experience has a chi square distribution of 17 with 5 degrees of freedom and a *p* value of 0.000, which suggests that the variable is well distributed and can be included in the model.

Table 5.7: Descriptive statistics for farmers' level of experience

Farmer Experience	*Certified producers n=54*	*Non-certified producers n=18*	Total %
1year	1.4%	2.8%	4.2%
2years	4.2%	1.4%	5.6%
3years	9.7%	4.2%	13.9%
4years	4.2%	0.0%	4.2%
5years	9.7%	2.8%	12.5%
>5years	44.4%	15.3%	59.7%
$\chi^2 = 17$, df = 5, *p value*=0.000			

Source: Survey Data, 2010

5.2.6 Farm size

Farm size is the total farmland owned by a farmer and it is measured in hectares. The factor farm size has a direct influence on the farm production and ultimately the income of the farmer. A farmer with a large farm is expected to generate more income and has the ability to participate more in certified organic farming since this is a commercially driven farming activity. Among the surveyed farmers, 34.7% have large farms of 11-20 ha in size-and of these, 25 per cent are certified producers. However, most smallholder farmers have small farms. In this sample, 26 per cent of farmers have farm sizes of 6 – 10 hectares. A significant percentage (18%) of farmers have farm sizes less than 5hectares and 11 per cent fall in the category of 21 – 30 hectares.10% of farmers have farms greater than 30hectares. Table 5.8 shows a frequency distribution of farm size and organic farms.

In rural areas, changes in farm sizes are not very common due to an absence of a vibrant land market and land is usually owned by the communally. Under such circumstances, farm size can only be used as a proxy to examine farmers' particular economic behaviour with regard to participation in certified organic farming. It is also interesting to note that almost half of the farms range from less than 5 hectares to 10 hectares.

Table 5.8: Farm size among organic farmers

Farm size	*Certified producers n=54*	*Non-certified producers n=18*	Total
<5ha	11.1%	6.9%	18.1%
6-10ha	22.2%	4.2%	26.4%
11-20ha	25.0%	9.7%	34.7%
21-30ha	9.7%	1.4%	11.1%
>30ha	5.6%	4.2%	9.7%

Source: Survey Data, 2010

The economic difference between certified producers and non-certified producers with access to farmland are summarised in Table 5.9. The main features are that the mean farm income per season for certified producers is higher (R6 730) than for the non-certified producers (R 4 430).

Table 5.9: Comparison of the mean income and farm size of organic farmers

Variables	Certified producers	Non-certified producers
Mean farm income	R6 790	R3 430
Mean farm size	10 hectares	3 hectares

Source: Survey Data, 2010

This could mean that certified producers may have enough income to access larger farm sizes. This is a good sign because it may mean that farmers participating in certified organic farming may be earning enough revenue to obtain larger farm sizes.

5.2.7 Land tenure

In most farming areas, land is considered an important aspect when farming. South Africa is pursuing land redistribution programmes that promote equity in land ownership. Such programmes are crucial since land ownership and free rider problems are considered to be the leading hindrances to agricultural development (Ortman & Machete, 2003). The survey results confirm that 71% of farmers have full land ownerships and 29 per cent farm on a communal type of land ownership.

Among those who fully own their farmland, 56 per cent have managed to certify their farms and 15 per cent produce non-certified organic commodities. The reason for a high number of certified farmers with full ownership could be that farmers may feel more secure about investing more if they have control of their landholdings. The proportion of certified producers, amounting to 18 per cent, who farm on a communal land system is quite substantial. Even after 1994, land remains the most constraining resource facing farming communities in Limpopo, and indeed, in most of the rural areas of South Africa. The significant number of farmers with no full ownership of farmland may lead to a question of whether it is possible that farmers do not participate in certified organic production because they are landless.

Table 5.10: Landholdings among organic farmers

Land ownership	Organic Production		Total
	Certified producers n=54	*Non-certified producers n=18*	
Free hold	55.6%	15.2%	70.8%
Communal land	18.1%	11.1%	29.2%

Source: Survey Data, 2010

5.2.8 Farm and non-farm assets

The differences in farming production may not only be influenced by farm size but also by farm and non-farm assets. Some of these are shown in Table 5.11. Ownership of fixed productive assets such as farm machinery may have a significant effect on income and production abilities (McKinley, 1993). Farm assets included 'bakkies', tractors, ploughs, harrowers and irrigation systems. The notable feature of ownership among these farm assets is that very few farmers own these assets. The highest proportion is 29 per cent of surveyed farmers, who own farm irrigation systems. This shows that majority of farmers are asset poor, the mean value of total farm assets per farmer is R1 155 with a high stand deviation of 8 944.9. It implies that farm assets are unequally distributed as they belong to very few farmers.

Table 5.11: Ownership and value of farm assets

Farm Asset	Number of farmers owning (n=72)	Mean value (R)
Bakkies	1 (1%)	20 975.0
Tractor	3 (4%)	31 190.0
Plough	7 (10%)	766.2
Harrower	2 (3%)	899.7
Irrigation system	21 (29%)	410

Source: Survey Data, 2010

About 65 per cent of the surveyed farmers own some non-farm assets, and some of these assets included computers, television sets and other household equipment.

5.3 KNOWLEDGE AND INFORMATION ACCESS TO ORGANIC PRODUCTION

Determinants of farmer participation in certified organic production also emanate from factors relating to information access and knowledge of organic production, market information and certification. The majority of smallholder farmers in South Africa lack the appropriate production information and successful farming experience to make sound judgements on many production decisions (Thamaga-Chitja & Hendriks, 2008). Without information of the practices associated with organic production, participation is improbable. Indeed, studies of participation have recognised information as a key variable, and it is typically found to correlate with participation. For example, farmers with easier access to information will experience a better application of organic practices and will have better access to markets.

At the same time, better knowledge of certification may improve the perception on certified production. The surveyed farmers indicated that 76 per cent of them accessed their information, especially market information, from farmer cooperatives and other farmer groups and of these, 58 per cent are certified producers and 18 per cent are non-certified producers. Eighty-seven per cent also indicated that they accessed most of their information through fellow farmers. More results showing the sources of information are summarised in Appendix 2, which presents the picture for information access.

Table 5.12: Information sources of organic farmers

Source of information	Mean	Standard Deviation	χ^2	*P* value
Farmer Organization	1.24	0.428	20.05	0.000
Farmers	1.12	0.333	40.50	0.000
NGO	1.65	0.479	6.72	0.010
Retailer	1.89	0.316	43.55	0.000
Magazine/Books	1.93	0.256	53.38	0.000
Neighbour	1.62	0.488	4.50	0.034
Extension Officer	1.14	0.348	37.55	0.000

Source: Survey Data, 2010

The validity of the sources of information is also important to analyse, and Table 5.12 shows the descriptive statistics for information sources of farmers. The data is well distributed with all variables having a significant *p* value. This implies that the identified sources of information are valid and of importance to farmers due to very small standard deviations.

Table 5.13: Farmers' knowledge on organic certification

Knowledge of certification	*Certified producers, n=54*	*Non-certified producers n=18*	Total
Sufficient knowledge	35 (48.6%)	7 (9.7%)	42 (58.3%)
Insufficient knowledge	18 (25.0%)	12 (16.7%)	30 (41.7%)

Source: Survey Data, 2010

A significant proportion of farmers (58%) had sufficient knowledge of certification. They understood what certification was and its procedures. Of these, 48 per cent were certified producers. This confirms that the less knowledge a farmer has with regard to organic certification, the more they are not motivated to participate in certified organic farming.

5.4 MEMBERSHIP OF FARMER GROUPS AND COOPERATIVES

Membership to farmer organisations seemed to be an important aspect for farmers to be certified organic producers. Of the 72 farmers interviewed, 65.3 per cent belong to a farmer organisation (Table 5.14) of which, 48.6 per cent are certified organic producers and 16.7 per cent are non-certified. A significant proportion of farmers (18.1%) are not affiliated to any farmer organisation. This is an expected result considering that there are a significant number

of non-certified farmers who regard certification of their farms as irrelevant. It could also be that farmer related organisations are not entirely seen as a means to access farm inputs, market information or rather access to group certification.

Table 5.14: Membership of farmer organisation

Farmer organisation	*Certified participants n=54*	*Non-certified participants n=18*	Total
Cooperative	48.6%	16.7%	65.3%
Farmer group	5.5%	6.9%	12.4%
Other	4.2%	0.0%	4.2%
Do not belong to any farm org	1.41%	16.7%	18.1%
Total	59.7%	40.3%	100.0%

Source: Survey Data, 2010

Farmers that are affiliated to any farmer related organisations were asked to indicate why they joined the organisation (Table 5.15). Most respondents stated that they joined or subscribed so that they could benefit from organic farming training courses offered by government and access group certification as it is cheaper compared to individual form of certification.

Table 5.15: Benefits of farmer related organisations (as perceived by respondents)

Benefits	*Certified participants n=54*	*Non-certified participants n=18*
Access farm training	37%	4%
Access group certification	68%	0%
Advisory services	42%	38%
Access market information	41%	21%

Source: Survey Data, 2010

Of the 59 certified farmers who are members of farmer related organisations 68 per cent ranked group certification to be of high importance for their subscription to an organisation.

5.5 SUMMARY

The evidence presented in the previous sections suggests that organic producers generally have less attributes in terms of assets but have a better network of information access especially for certified producers. A closer look into the descriptive statistics comparing the two categories of organic farmers indicates that organic producers are generally female farmers and have an average age of 45 years. The majority have a primary level of education that may be one of the determinants for not participating in certified organic production. Socio-economically, certified participants earn higher revenues compared to non-certified producers, and they have better farming experience. It is also noticeable that certified participants have larger farm sizes in this regard. Farmers do access their market, organic production and certification information from mainly farmer organisations and from fellow farmers.

The non-certified participants have less access to assets and information in comparison to participants. In addition, participants in certified organic production tend to show different profiles of information access and assets. The next chapter will provide a closer look at the perception of these farmers towards certified organic farming and, indeed, will explain other factors that may explain the commercial behaviour of different organic farmers.

CHAPTER 6: DETERMINANTS OF FARMER PARTICIPATION IN CERTIFIED ORGANIC FARMING

6.1 INTRODUCTION

The descriptive results in Chapter Five showed the characteristics of organic farmers and noted what characteristics set apart farmers participating in certified organic production from those who were non-certified participants. It was evident that farmers with certified farms that produced certified commodities were more commercially oriented. This chapter researches what factors influence farmer participation in certified organic farming. Certified organic farming has been promoted as a way of helping smallholder organic producers to avoid traps associated with low and volatile commodity prices, blocked market access and poor quality produce. These are important and worthwhile agendas but evidence that smallholder organic farmers are not participating in certified organic farming has also been well documented. Therefore, this chapter asks whether, in practice, certified organic farming is ideal for smallholder organic farmers and what determines their participation in this farming speciality.

Although there are some studies on certified organic farming in Africa, there is still a lack of useful information that determines participation by organic farmers, specifically in relation to certified organic farming in South Africa. Thus, the objective of this chapter is to present the empirical results of the econometric model, which is based on the conceptual framework in Chapter Four. Ideally, the model is designed to present the factors that determine farmer participation in certified organic farming. As such, the Chapter analyses certification related characteristics, market characteristics and farm characteristics (including socio-economic characteristics), and their respective influence on the farmers' level of participation. These are mostly internal factors because, farmers are well aware of certification and its required procedures, thus aspects such as the role of NGOs and government are not included as the latter do not play a significant role in certifying farmers but they (government and NGOs) endeavour to train farmers in certification related processes.

The chapter, then, attempts to answer three questions:

1. What determines farmers' decision to participate in certified organic farming?

2. What kind of model would enable the understanding of farmer participation in such a speciality farming system?
3. Which factors are important in influencing farmer participation and, how do these factors subsequently affect the level of participation in such a commercially driven farming practice?

6.2 ESTIMATION PROCEDURE

The theoretical model in Chapter Four showed that the model of farmer participation followed a discrete form of analysis. Thus, in estimating the model, it is assumed that not all farmers participate in a certified form of farming. Some farmers may not prefer to participate in that particular farming option in favour of another, while others may be excluded by various conditions. Therefore, participation follows a dichotomous behavioural path. Some scholars suggest that farmer participation is determined by either socio-economic factors, demographic or market related factors, while others suggest that participation results from a combination of factors, since farmers differ in decision-making levels. Consequently, to identify the kind of model that can predict farmer participation, several models are tested with the mentioned factors separately, and a final model is estimated that includes all factors from farm, market, certification and farmer demographic aspects.

6.2.1 Estimating the empirical model

Limited dependent variable models can be applied for econometric estimation. This type of non-linear statistical model relates choice probability to explanatory factors. The objective is to model and estimate the probability that farmers will participate on condition of the specific farm, farmer, market and certification characteristics. For such a type of binary choice problem, probit or logit models are most appropriate (Amemiya, 1985; Jack &John, 1997; Greene, 2000). However, the choice of a continuous probability distribution for producing predictions cannot be justified theoretically, thus a probit model is recommended (Amemiya, 1985). Probit modelling is used to explain a discrete dependent variable with the empirical specification formulated in terms of a latent response variable (Vanslembrouck *et al.*, 2005). Thus, a farmer's decision to certify their farm can be expressed in the framework of a discrete choice model.

It is assumed that in certified organic farming, the farmer's decision to participate in certified organic farming or not, depends on the unobservable index Y_i, which is determined by the explanatory variables. Y_i denotes the decision of farmers to certify their farms. Y_i takes the value 1 if the farmer decides to certify his/her farm, 0 indicates a decision not to certify his farm. Let the vector X represent the information on all of the explanatory characteristics. In this case, the predicted values from a regression analysis beyond the limits of 0 and 1 are meaningless and the model can be specified as follows;

$$y = X'\beta + \varepsilon, \quad y = 1 \text{ if } y^* > 0, \text{ 0 otherwise,} \tag{6.1}$$

$$E[\varepsilon/X] = 0 \tag{6.2}$$

$$Var\,[\varepsilon/X] = 1 \tag{6.3}$$

where, y_i represents the binary dependent variable,

X_i being the explanatory variable;

ε as the independently distributed error term assumed to be $X \sim N(0, \sigma^2)$; and

β representing the coefficients of covariates.

The probit model is specified as equation (6.4) and the parameters are estimated by the maximum likelihood estimation procedure. The model follows a normal distribution and takes the following forms (Wooldridge, 2001):

$$Prob(y = 1) = \int_{-\infty}^{x'\beta} \emptyset(t)dt = \Phi(X'\beta) \tag{6.4}$$

$$Prob(y = 0) = 1 - \Phi(X'\beta) \tag{6.5}$$

Taking equation 6.4 and 6.5, we obtain the density of y, given X_i, and equation 6.6 is as follows:

$$Prob(y/X) = [\Phi(X'\beta)]^y[1 - \Phi(X'\beta)]^{1-y} \tag{6.6}$$

Let $\{y_i, X_i\}_i^n = 1$, where n is identically independent with normally distributed observations. Thus the log likelihood function for this model is:

$$\ln(l_\beta) = \sum_{i=1}^{n} y_i \ln \Phi(X'\beta) + (1 - y_i) \ln(1 - \Phi(X'\beta)) \tag{6.7}$$

Hence, the estimation of the parameter β is equivalent to the maximum of the log likelihood function. To evaluate the overall significance of the model, a likelihood ratio test is used which has a χ^2 distribution and it is derived from the maximum of the log likelihood function, taking an assumption that all parameters except the intercept are equal to zero (Aldrich & Nelson, 1984; Luzar & Diagne, 1999).

6.2.2 Model Variables

To estimate the models in (6.1), (6.2), (6.3) the data collected in 2010 from 72 farmers is used. The dependent variable of farmer participation is measured by the probability that a farmer will participate in certified organic farming. For these equations, there are two dependent variables: the first indicates whether the farmer participates in certified organic production or not. The indicator variable gets the value of one if the farmer participates, and zero if he does not. To examine the determinants of farmer participation, a number of explanatory variables are specified to reflect the effect of participation.

These explanatory variables are divided into three constructs: farm structure, farmer structure, and certification and market related structure (which includes access to information and membership to a farmer organisation). The farmer and farm structures tend to capture a number of possible concepts of farmer behaviour. The farmer structures were modelled with three variables, that is, the age of the farmer, the gender of the farmer and the educational level. The age of the farmer normally provides a proxy for experience in farming but more importantly these farmers are believed to have stronger social networks and have established credibility in their farming and commercial network. This implies that older farmers are more informed about the various farming innovations. Their ages were measured in number of years. The gender of a farmer reflects better participation since female farmers spend more time in agricultural related activities. The variable assumed a value of one if male and zero for females.

The attributes of certification and market structure involve certification related costs, premium prices of certified commodities, membership to a farmer organisation and access to information. Among these, access to information tends to improve the quality of decisions that farmers take as these also depend on their accessibility to information. The more

information the farmer has on marketing, organic production and organic certification, the more they would be inclined to participate – thus increasing participation in certified organic production. A detailed description of the independent variables is presented in Table 6.1.

Table 6.1: Description of variables related to certified organic farming

Variable name	Variable description	Modalities
Farmer characteristics		
AGE	Age of respondents	Years
GENDER	Respondent's gender	1 if male; 0 female
EDUCATION	Respondent's education level;	1 if at least attended matric; 0 otherwise
Certification and market related characteristics		
INFOR	Whether the farmer has basic knowledge of organic certification	1 if the respondent has at least basic knowledge about organic certification; 0 otherwise
PREMIUM PRICES	Premium price from trading organic farming	1 if the farmer receives premium price; 0 otherwise
GRP MEMBERSHIP	Membership to farmer groups or cooperative	1 has membership; 0 otherwise
CERTIFICATION COSTS	Certification costs	Unit cost
Farm Characteristics		
FARM EXP	Farmer's farming experience	Years
FARM INCOME	Farmers' income	
LAND TENURE	Whether the farmer has full ownership of land or he/she is on a communal land system	1 farmer fully owns land; 0 communal land system
FARM SIZE	Total acreage used	Acres

6.2.3 Hypotheses

The study aims to determine the effect of certification, market, farm and farmer characteristics on farmer participation in certified organic farming. Table 6.2 shows the hypothesised relationship between the explanatory variables and farmer participation. Three models corresponding to three constructs are simulated to obtain a more representative model. The positive sign on the explanatory variable implies that a unit increase in the variable leads to an increase in the probability of participating; and a negative sign means that a unit increase in the explanatory variable leads to a decrease in the probability of participating in the farming option.

Table 6.2: Hypothesised relationship with farmer participation

Variable constructs	Participation decision	Participation level
Farmer structure		
• Age	+	+
• Gender	-	-
• Education	+	+
Certification and market structure		
• Information access	-	-
• Market prices	+	+
• Group membership	+	+
• Certification costs	-	-
Farm structure		
• Farm experience	+	+
• Farmers' income	+	+
• Land ownership	+	+
• Farm size	-	-
• Access to farm assets	-	-

EVIEWS econometric software was used to run the set of models. The results of the models are presented per variable construct and later an overall model that includes all constructs is modelled. First, the probit results will be presented to determine the significant factors in the decision to participate. Later, a theoretical exposition and literature review of those variables affecting the decision to participate are discussed. These factors are regarded as leading factors constraining farmers from participating more in certified organic production. The results are presented as an assessment by three independently tested models.

6.3 ASSESSMENT OF FACTORS THAT DETERMINE FARMER PARTICIPATION IN CERTIFIED ORGANIC FARMING

In modelling farmers' participation in certified organic farming, it is anticipated that socio-economic factors, certification related costs and access to information in terms of production practices, market prices and opportunities would be key factors influencing the participation process. The probit regression analysis is used to identify those influential factors determining farmers' decision to get involved in certified organic farming. Four models are estimated to test the independence of variables and their particular influence on participation.

In model 1, farmer characteristics are estimated. Model 2 includes variables from the farm structure. Model 3 describes variables from the certification and market related factors. These are used in the construction of models 6.1, 6.2 and 6.3 respectively. These models are estimated independently to test out variable behaviour before estimating an overall model for participation in certified organic farming. In addition, independent testing of these variables allows us to find out if a farmer's decision to get involved in certified organic farming is either as a result of a particular set of factors or a combination of all these factors.

6.3.1 The Farmer structure model

In the farmer structure model, factors included are age, gender and level of education. Table 6.3 shows farmer characteristics that influence a farmer's decision to participate in certified organic farming. The -2 Log Likelihood for this model is 38.44 with an associated *p*-value of 0.25 which tells us that the current model does not fit well. Not all the explanatory variables are significant. Therefore, this model cannot be used to conclude that only farmer characteristics influence farmers to participate in certified organic farming.

Table 6.3: Estimation of demographic factors (Model 6.1)

Variable	Coefficient	Std. Error	Marginal effect	Prob.
C	-2.308	0.989	-2.334	0.019
Age	0.340	0.179	1.895	0.057
Gender	-0.057	0.338	-0.171	0.864
Education	0.232	0.155	1.493	0.135

McFadden R-squared	0.050	Mean dependent variable	0.263
S.D. dependent var	0.436	S.E. of regression	0.433
Akaike info criterion	1.178	Sum squared residual	12.755
Schwarz criterion	1.305	Log likelihood	-38.440
Hannan-Quinn criterion.	1.229	Deviance	76.880
Restr. Deviance	80.976	Restr. log likelihood	-40.488
LR statistic	4.095	Avg. log likelihood	-0.554
Prob(LR statistic)	0.251		

***, **, * denote significance at 1%, 5% and 10% levels respectively

The variable age is significant with a *p*-value of 0.057 while the level of education has a p-value of 0.135 which is not significant, measuring at 0.05 per cent confidence level. Demographic factors influence farmers' decision to participate but are not stand alone

factors; probably they could have an effect when combined with other factors. The demographic model has a McFadden R^2 of 0.05 which is very low for a well distributed model. The deviation (76.8) in the model variables is quite high as well. With such statistics, a discussion of the variables is not explored. This kind of model cannot be used to predict farmer participation and thus the next section tries to model the farm structure.

6.3.2 Farm structure model

In the previous subsection, the farmer characteristics were not significant enough to show how they would influence a farmers' decision to participate in certified organic production. In the farm structure model, factors such as farm size and type of land ownership, farmer's farming experience; farmers' income and access to farm assets are modelled. Model results reveal that, the model has a -2 Log Likelihood of 38.95 with a *p* value of 0.39. Not all explanatory variables fully outline the behaviour of the dependent variable, as they are not statistically significant. Just like the demographic model, this model is statistically not well distributed and as such, we cannot draw policy conclusions that only socio-economic factors influence farmers to get involved in certified organic farming. Table 6.4 shows the parameter estimates of the model.

Table 6.4: Estimation of socio-economic factors (Model 6.2)

Variable	Coefficient	Std. Error	Marginal effect	Prob.
C	-1.459	0.899	-1.623	0.104
Farm size	0.124	0.165	0.748	0.454
Farming experience	-0.160	0.113	-1.414	0.157
Farm assets	0.225	0.385	0.585	0.558
Famers' Income	0.252	0.346	0.727	0.467
Landownership	0.461	0.383	1.202	0.229

McFadden R-squared	0.062	Mean dependent variable	0.263
S.D. dependent variable	0.443	S.E. of regression	0.447
Akaike info criterion	1.248	Sum squared residual	13.193
Schwarz criterion	1.438	Log likelihood	-38.958
Hannan-Quinn criterion	1.324	Deviance	77.917
Restr. Deviance	83.10	Restr. log likelihood	-41.550
LR statistic	5.182	Avg. log likelihood	-0.541
Prob(LR statistic)	0.393		

***, **, * denote significance at 1%, 5% and 10% levels respectively

The McFadden R^2 (0.06) shows that this model does not accurately predict farmers' decisions to participate. Model variables are also highly deviated (77.9) which implies variables are not consistent with the model, thus prediction cannot be followed. This model does not illuminate the literature of farmer participation in certified organic farming and thus a detailed discussion of variable behaviour is not explored.

6.3.3 Certification and market structure model

In estimating this model, variables such as certification costs, access to information, premium prices for certified products and membership of a farmer related organisation are used. The reason for estimating such variables is that we believe that these have a better effect on farmers' decisions to participate in this structure. As such, model results indicate that the model has a -2 Log Likelihood of 31 with a *p* value of 0.000, which is significant. From the four variables, two are statistically significant (certification costs and premium prices), measuring a 5 per cent confidence level. Table 6.5 demonstrates that these do have an influence on farmers' decisions.

Table 6.5: Estimation of certification and markets factors (Model 6.3)

Variable	Coefficient	Standard Error	Marginal effect	Prob.
C	-2.231	0.722	-3.088	0.002
Certification costs	1.155	0.405	2.846	0.004
Membership	-0.000	0.001	-0.830	0.406
Premium prices	0.001	0.000	2.740	0.006
Information access	-0.143	0.118	-1.211	0.225
McFadden R-squared	0.253	Mean dependent variable		0.263
S.D. dependent variable	0.443	S.E. of regression		0.386
Akaike info criterion	1.000	Sum squared residual		10.02
Schwarz criterion	1.158	Log likelihood		-31.00
Hannan-Quinn criterion	1.063	Deviance		62.01
Restr. Deviance	83.10	Restr. log likelihood		-41.55
LR statistic	21.08	Avg. log likelihood		-0.430
Prob(LR statistic)	0.000			

***, **, * denote significance at 1%, 5% and 10% levels respectively

Model 6.3 is relatively better than the previous two models because its goodness of fit tests are relatively high; however, the tests are not informative because of the large number of zero frequencies. The McFadden R-square measure (0.25) indicates that the model does not

perform well. The certification cost variable is positive in this model, which suggests that with costs, one is not likely to participate, but in model 6.4, it gives a negative sign. This implies that the probability of farmers participating in certified organic farming could not be concluded. In the following subsection, an overall model is estimated, which encompasses all of the three variable structures. The significant determinants identified in this model are discussed in detail.

6.3.4 Decision to participate in certified organic production: overall probit results

The overall model for decisions to participate in certified organic farming identifies characteristics that stimulate farmers to participate as opposed to those who do not. The model includes significant and uncorrelated factors from the three structures explained earlier including the market characteristics. Unlike models from the previous subsections, this model attempts to present a holistic view, incorporating factors associated with the farm, farmer and certification and market related factors.

The model is specified as:

$$Pr_{certified} = f\begin{pmatrix} age, gender, farmincome, accesstofarmassets, farmsize, farmerexp, \\ landownership, informationaccess, membership, certcost, premiumprices \end{pmatrix}$$

That is, the probability of participating in certified organic production depends on the set of explanatory factors above. The variable education was eliminated from the overall model because it had a high correlation with membership to a farmer organisation. Table 6.6 presents the results of the probit estimation of factors significantly influencing the decision to participate in the farming option.

Table 6.6: Determinants of farmer participation in certified organic production

Variable	Coefficient	Std. Error	Marginal effect	Probability
C	1.888	1.251	1.508	0.131
Age	0.243	0.199	1.220	0.022
Gender	-0.831	0.482	-1.724	0.084
Farmers' income	-0.214	0.426	-0.503	0.104
Farm size	0.076	0.198	0.384	0.701
Farming experience	-0.219	0.139	-1.573	0.115
Landownership	0.417	0.443	0.941	0.346
Information access	-0.111	0.132	-0.840	0.000
Group membership	0.311	0.001	0.755	0.050
Certification costs	-1.589	0.514	-3.090	0.002
Premium prices	0.001	0.000	2.773	0.005

McFadden R-squared	0.645	Mean dependent variable	0.263
S.D. dependent var	0.443	S.E. of regression	0.380
Akaike info criterion	1.060	Sum squared residual	8.842
Schwarz criterion	1.408	Log likelihood	-27.17
Hannan-Quinn criterion	1.198	Deviance	54.35
Restr. Deviance	83.10	Restr. log likelihood	-41.55
LR statistic	28.74	Avg. log likelihood	-0.377
Prob(LR statistic)	0.001		

***, **, * denote significance at 1%, 5% and 10% levels respectively

The goodness of fit test is highly significant, indicating that the model does fit the data well. The tests tell us that the current model fits better than a model with just an intercept (Windmeijer, 1995). The McFadden R^2 value of 65 per cent is another way to assess model fit (Veall & Zimmermann, 1992), and the R^2 indicates that the model does perform well. Results show that seven variables are significant at various confidence levels. The model correctly predicted 65 per cent of the observations, with a significant *p* value of 0.001. This kind of model is helpful to address the factors that determine farmer participation in certified organic farming.

Three of the variables were positively associated with the probability of participating in certified organic farming. The age of the farmer, membership to a farmer organisation and market premium prices for certified commodities. The other five significant factors were negatively associated with the probability of participating in certified organic production. The gender of the farmer, farmers' income, farming experience, information access and certification costs tend to decrease the likelihood of participating. With the exception of the farmers' income and farming experience, all the significant variables had the expected signs.

Among the positive factors, the positive sign on age implies that for every one year increase in the age of a farmer, the probability that a farmer will participate in certified organic farming will increase by 1.22. Many participation studies have confirmed the role of age on the participation decision of farmers (Chambers & Foster, 1983; Nagubadi, McNamara, Hoover & Mills, 1996). Membership of a farmer organisation has considerable effect on farmers' participation. This result with a coefficient of 0.3 calls for farmers to subscribe to cooperatives, community farmer groups and other related agricultural groups. The effect is high because in farmer groups, access to certification is easier and the presence of an internal control system enable proper adherence to certification requirements. The next positive factor in farmer participation is the ability to receive higher market prices for certified commodities. This variable has a higher marginal effect, meaning that more access to premium prices for certified products might increase the chance of farmers getting interested in certified organic production. Typically, access to better market prices will encourage farmers to produce more certified products through getting certification and adhering to certification requirements.

The results indicate that the marginal effect of certification costs (-3.090) on the likelihood of farmers, certifying their farms is the most important one among the negative factors. That is, every additional cost in the certification process will decrease the probability of a farmer participating in certified organic farming. Certification is a basic requirement for farmers to be associated with certified organic producers, but its costs are relatively high for smallholder farmers. In the South African context, farmers are certified by mostly European and North American certifiers because; South Africa has no organic certification law. Thus, the government cannot develop a certification system, and the implication for this is that farmers must pay for accommodation, allowances and inspection fees for inspectors from Europe and North America. Similar studies that were discussed in chapter 2 show that quality standards do have implications to producers. Some of these implications are a reduction in trading of organic products and diversion of the cropping system. Thus, certification related costs deter farmers from engaging in certified organic production and this ultimately lowers their participation. This result should inspire government to speed up the process of developing a stand-alone policy on certification of organic production.

The variable gender has a coefficient of -0.831. This relationship implies that for every one increase in the number of male farmers, the decision to participate in certified organic

farming will reduce by 1.724.This indicates that female farmers are more positive about participating in certified organic farming than male farmers. This result is similar to Dolisca et al. (2006) who found that female farmers usually perceive such activities as a means of meeting basic needs and also as a support mechanism for increasing self-reliance. Farm income with a -0.214 coefficient has a negative effect on participation. This result implies that a farmers' income does not improve the ability of a farmer to become a certified producer. Furthermore, it implies that when farmers have access to a non-farm income, they may not necessarily decide to participate in certified organic production since their non-farm income can function as a substitute for the better incentives in certified organic production.

Scholars studying farmer participation in agri-environmental contracts find farming experience to be of primary importance in explaining farmers' participation (Wynn , Crabtree & Potts, 2001; Damianos & Giannakopoulos, 2002; Vanslembrouck *et al.*, 2005; Defrancesco, Gatto, Runge & Trestini, 2008). However, study results are not always consistent. In this study, farmer experience with a -0.219 coefficient has a negative relationship with farmer participation. A possible explanation that can be advanced for this is that farmers with a relatively low level of farming experience are likely to have less knowledge and information on organic farming and certification requirements. These farmers are usually young and have very limited farming, experience. Thus, the probability of their participation in certified organic farming is low.

One other important variable that is a hindrance to farmers is limited access to information in terms of organic production, marketing information and certification processes. Results indicate that getting information through farmer organisations, extension contacts and fellow farmers is rather weak and has a high marginal effect on decreasing the probability of farmers participating in certified organic production. This result calls for a very responsive extension service to assist in the areas where farmers engage in organic farming. Certified organic farming requires a lot of investment in monetary terms but also in information, knowledge and awareness of the current innovations in the world. The extension services and farmer organisations assist by providing up-to-date information about market access, market processes and how to deal with the issue of certification. South African smallholder farmers are at a disadvantage here because; the country has no legislation that informs and guides and

protects organic farmers. This has major implications for the way government promotes certified organic production among smallholder farmers. For optimal assistance, farmers should be well equipped with technical knowledge but also understand the processes of certification and marketing of their products.

Other factors were not significant. The factors that were positive, included farm size and landownership. Access to arable land does not have a high marginal effect, meaning that more access to arable land might not increase the chance of participating in certified organic production. Land ownership has a 0.417 coefficient that is a positive relationship with farmers' participation decision. This implies that farmers who own farms have a higher probability to invest in certified organic farming compared to farmers who farm on a communal system of land. The implication for this finding is that it is important for policy makers to ensure that smallholder farmers secure tenure arrangements that can enable long-term investments by farmers. Land ownership provides a positive incentive in facilitating farmer investments on their farms.

6.4 SUMMARY

It is evident that stand-alone models of the demographic structure, certification structure and socio-economic structure do not predict farmer participation as these predict a less than 20 per cent chance of a farmer participating in certified organic farming. However, a combination of these factors does predict a 65 per cent chance of farmer participation. The overall model results of farmer participation provides insights into the effect of socio-economic, demographic and certification and market factors. These factors affect the participation process in two ways. Firstly, the factors affect the decision of the farmer to either participate or not. Secondly, they affect the level of participation. The overall results are summarised in Table 6.7. Only the signs and levels of significance are shown.

Table 6.7: Summary of determinants of farmer participation in certified organic farming

Variable	Participation decision	Participation level
Farmer structure		
• Age	+	+
• Gender	-	-
Certification and market structure		
• Information access	-	-
• Market prices	+	+
• Group membership	+	+
• Certification costs	-	-
Farm structure		
• Farm experience	-	-
• Farmers' income	-	-
• Land ownership	+	+
• Farm size	+	+

The results of the model on the farmers' decision whether to participate in certified organic farming, provide some indications of the factors responsible for inhibiting or enhancing participation. The age of the farmer tends to influence his decision to participate. Older farmers were found to be positive and this is a significant factor. Probably the contribution of farming experience through age is the salient factor. The result may also imply that older farmers may be in a much stronger position to invest in certified organic farming. These farmers often have farm -assets that increase their mobility to adapt to certified production. Female farmers had the higher probability of participating. This could be because female farmers tend to stay on farms to cater for the day-to-day farm activities. On the other hand, male farmers were less likely to participate in certified organic production. Farm size and landownership had positive relationships with participation, but were not significant. Thus, a conclusion would not be drawn in this regard.

The results also confirm that affiliation to a farmer organisation is an important factor influencing the decision to participate. Throughout, it was found that market prices associated with being of a premium nature leads to an increased likelihood for farmers to participate in the farming option. Strong constraining factors are information access and certification costs. These had a higher marginal effect on farmers' participation and require the government to intervene in and advance the welfare of smallholder organic farmers.

CHAPTER 7: AN ANALYSIS OF FARMERS' PERCEPTION OF CERTIFIED ORGANIC FARMING AND ITS SUBSEQUENT INFLUENCE ON THE PARTICIPATION DECISION

7.1 INTRODUCTION

The previous chapter identified and assessed determinants responsible for predicting farmer participation in certified organic production and further indicated their marginal effects on the core variable, and hence these were suggested to be determinants that influenced participation. However, conclusions drawn in Chapter One of the study suggest that the problem of low farmer participation might also result from farmers' perceptions of certified organic farming. This chapter then goes further to investigate if farmer participation is also affected by perception, and therefore, it analyses famers' perception of certified organic production and tries to also identify factors influencing the perceptions of these farmers.

Certainly, certified organic farming has been quite significant at promoting smallholder organic farmers in moving away from the subsistence type of farming towards a more market oriented farming structure in South Africa. Scholars anticipate that farming with organic certification will continue to improve rural farmers' livelihoods if farmers comply with the necessary requirements. South Africa has a long tradition as a producer and exporter of agricultural products, supplying both organic and conventional commodities to the world food markets, and, organic farming has become an attractive farming option for these farmers, as the country is in a good position to promote and expand this farming enterprise.

However, organic certification, a regulation that requires South African farmers to identify themselves as farmers producing noteworthy organic commodities has implications to smallholder organic farmers. In addition, these farmers have to comply with organic standards imposed by foreign certifiers, and as a result, farmers perceive the significance of certified organic farming in various ways. In particular, farmers may perceive both the advantages and disadvantages of certified organic farming. Advantages may be specifically related to the economic benefits, improvement of their farm image and access to more markets; and the disadvantages may be perceived costs associated with organic certification.

Dissatisfaction with certified organic farming may persuade farmers to change to other farming alternatives and prevent other potential farmers from participating in certified organic farming. In this context, it is useful to analyse farmer perception of certified organic farming and the factors influencing such perceptions. Knowledge of these factors may assist policy to strengthen counter measures for promoting certified organic farming among smallholder farmers, and as such, the objective of this chapter is to analyse farmers perceptions of certified organic farming.

The chapter begins with the previous studies on farmer perception and the reported factors. The second section discusses the factors influencing farmer perception with certified organic farming. The empirical model is presented in section three and later, results and discussions are presented in the fourth section. The final section provides a summary of the chapter.

7.2 PREVIOUS STUDIES ON FARMER PERCEPTION OF CERTIFIED ORGANIC FARMING

Perception in this study is conceptualised as the affective reactions of farmers towards the use of organic certification. In other words, perception reflects the degree to which a farmer believes that participation in certified organic farming evokes positive returns. Given that organic certification is an institutional method that is relatively new in the food sector, there have been some attempts to evaluate its performance. However, few studies have investigated certification in the organic food industry. These include Schulze, Jahn and Spiller (2007) who use regression analysis to assess farmers' acceptance of organic certification in Germany. The study reported that the perceived bureaucratic costs, effectiveness and usefulness of organic certification were the major factors that determined farmer perception.

In addition, Schulze, Albersmeier, Gawron, Spiller and Theuvsen (2008) reported that cost and benefit ratio, the evaluation of the requirements, the perceived costs of certification significantly affected farmer perception. Studies of farmer perception and satisfaction by Bravo *et al*. (2012); Nordlund and Egelyng (2008); Schulze and Spiller (2010) also indicate that perceived bureaucratic costs and the effectiveness and usefulness of the organic certification are key determinants of farmer perception and satisfaction. In the following section, an analysis of factors influencing farmer perception is presented and some

hypotheses are included. These describe the effects of these factors on farmers' perceptions with certified organic farming. The chapter focuses on the perceived benefits, perceived access to more markets, perceived farming image improvement and perceived costs of organic certification.

7.3 FACTORS INFLUENCING FARMER PERCEPTION OF CERTIFIED ORGANIC FARMING

7.3.1 Distribution of farmers' perception on certified organic farming

Based on the survey data, this section summarises the distribution of farmer perception on certified organic farming. In order to get information on their perception to certified organic production, farmers were asked several questions and the first question was about the perceived benefits of certified organic farming. The second question asked farmers if certified organic production provided easier access to commodity markets, the third question asked farmers if certified organic farming was a better farming option compared to other practices, and if farming as a certified farmer improved the image of their farming. Lastly, a question was asked if, indeed, farmers perceived certified organic production to have high input costs.

The distribution of farmers' perception offers a clear representation on how farmers perceive certified organic farming and it provides an opportunity for developing appropriate policy recommendations. The results indicate that 77.8 per cent of organic farmers perceived that they had observed some benefits in certified organic farming and 22.2 per cent disagreed. In addition, farmers who perceived benefits in certified organic production were asked if they had responded by certifying their farms, to improve their farm income. According to these farmers, 44 had certified their farms and 12 farmers had not certified. Farmers, however, agreed that producing certified commodities did not make them a better farming option and 51.4 per cent disagreed that certifying their farms would improve their farming image in the community. 79.2 per cent[5] of farmers agreed that certified organic farming had high-related input costs. Table 7.1 presents the descriptive statistics for the mentioned variables.

5Frequency distribution for all farmer perception variables are in Appendix 3

Table 7.1: Descriptive statistics of farmers' perception

Variables	Organic Producers	Mean	Standard Deviation	Standard Error Mean	χ^2	*P* value
Perceived benefits	Certified participants	1.19	0.392	0.053		
	Non-certified participants	1.33	0.485	0.114	22.2 (1)	0.000
Access to markets	Certified participants	1.13	0.339	0.046		
	Non-certified participants	1.56	0.511	0.121	20.05 (1)	0.000
Better farming Option	Certified participants	1.43	0.499	0.068		
	Non-certified participants	1.33	0.485	0.114	2.72 (1)	0.099
Improved farm Image	Certified participants	1.57	0.499	0.068		
	Non-certified participants	1.33	0.485	0.114	0.056 (1)	0.814
High input costs	Certified participants	1.15	0.359	0.049		
	Non-certified participants	1.39	0.502	0.118	24.50 (1)	0.000

Source: Survey Data, 2010

The information gleaned from Table 7.1 show that the deviation in perception is not large between the two groups of farmers, which range from 0.339 to 0.511. This implies that both certified and non-certified producers do to some extent share opinions towards certified organic farming. Farmers' perceptions also have very low standard errors with the highest being 0.1. Statistically, these variables can predict farmer perception towards certified organic production. Apart from the variable improved farming image, all other variables are highly significant at 0.05 and 0.1 confidence intervals.

7.3.2 Testing for normality and outliers

Normality in data is often a conventional assumption in the estimation process. Data distribution either with a highly skewed nature or with high kurtosis is indicative of non-normality that has random effects on model specification. The presence of non-normality may exist due to outlier cases in the data set; these outliers are extreme values on variables that distort modelling. Testing for normality in data sets is important when handling latent variables. The result in Table 7.2 confirms that the univariate non-normality is not evident in the data set because kurtosis scores for all variables do not exceed the maximum level of normality range.

Table 7.2: Normality tests for perception variables

Variables	Skewness	Standard Error of Skewness	Kurtosis	Standard Error of Kurtosis
Perceived benefits	0.385	0.283	-0.142	0.559
Access to markets	-0.421	0.283	-0.246	0.559
Better farming	-0.156	0.283	1.617	0.559
improved image	0.846	0.283	0.179	0.559
Costs of certifying farms	-0.832	0.283	0.629	0.559

Source: Survey Data, 2010

7.3.3 Testing for differences in perception between farmers

In the previous subsection, questions relating to perceived benefits, market access, better farming orientation and high input costs enabled us to develop variables that relate to farmer perception. To determine the significance of the differences between the mean values of the variables used in determining farmers' perception, a one-way Analysis of Variance (ANOVA) was carried out. The results of the ANOVA for the mentioned farmer perception variables are presented in Table 7.3. In this table, it can be seen that there are statistically significant differences for access to markets, better farming options and stricter requirements and high input costs.

Table 7.3: ANOVA results for selected perception variables

Variable		Sum of Squares	Degrees of freedom	Mean Square	F-ratio	*p*-value
Perceived benefits	Between Groups	0.296	1	0.296		
	Within Groups	12.15	70	0.174	1.707	0.196
	Total	12.44	71			
Access to Markets	Between Groups	2.449	1	2.449		
	Within Groups	10.54	70	0.151	16.270	0.000
	Total	12.98	71			
Better farming Option	Between Groups	0.116	1	0.116		
	Within Groups	17.20	70	0.246	0.471	0.495
	Total	17.32	71			
Improved farm Image	Between Groups	0.782	1	0.782		
	Within Groups	17.20	70	0.246	3.184	0.079
	Total	17.98	71			
High input Costs	Between Groups	0.782	1	0.782		
	Within Groups	11.09	70	0.156	4.937	0.030
	Total	11.87	71			

Source: Survey Data, 2010

The perceived benefits were found to be non-significant between the two groups of organic farmers. This implies that the perceived benefits for both certified and non-certified producers are generally similar and, as such, perceived benefits is not an important factor in describing the differences between organic producers. Both certified and non-certified organic producers do not share the same perception of the benefits of certified organic farming. This is also true for the variable better farming option, which is also statistically not significant.

7.3.4 Influential factors and their hypotheses

7.3.4.1 Perceived benefits of certified organic farming

Farmers' perceived benefits of certified organic farming varies for each farmer and these benefits can be divided into internal benefits such as increased income through premium prices and an improved farming image) and external benefits which include market access, high prices and social capital (Karipidis, Athaiadis, Aggelopoulos & Gioplikis, 2009; Bravo *et al*, 2012). The hypothesis that applies to this factor is as follows:

H_1: The higher the perceived benefits of certified organic farming, the higher the likelihood that farmers participate in the farming option

Farmers' perceived benefits of certification are absolutely vital and it is clear that no operating organic farming system can continue to exist at a practical rate without proper organic certification (Van Zyl, 2000). Farmers are aware that being able to trade with a recognized certificate has numerous benefits. Organic certification adds value in economic and other ways (Harris *et al.*, 2001). Farmers' perceptions of the benefits associated with certified organic farming were assessed based on five variables such as high premium prices, social capital, and access to organic and conventional markets, access to international markets and access to domestic markets. Results presented in Table 7.4 show that farmers perceive that certified organic farming provides high premiums, access to both organic and conventional markets and access to international markets with a mean rating ranging from 1.13 to 1.60. Results also show that there were very little variations in their perceptions of

benefits of certified organic farming; these benefits had a varying standards deviation that ranges from 0.333 to 0.494. All variables in perceived benefits are highly significant.

Table 7.4: Farmer's perceived benefits of certified organic farming

Benefits of certified organic farming	Mean	Standard Deviation	Standard Error Mean	χ^2	*P* value
Premium prices	1.22	0.419	0.049	22.22(1)	0.000
Organic and conventional markets	1.60	0.494	0.058	2.72(1)	0.099
Social capital	1.24	0.428	0.050	20.06(1)	0.000
In'tl markets	1.13	0.333	0.039	40(1)	0.000
Domestic markets	1.24	0.428	0.050	6.72(1)	0.010

Source: Survey Data, 2010

The premium prices reflect the quality of the organic product. Several respondents pointed out that the premium prices also reflected the marketing structures for trading the organic produce. From the above results, premium prices, access to more markets and social capital indicate that they are a reflection of a farmer's decision to certify their farm. These are predictors to farmer participation. Van Elzakker and Tulip (2000) suggest that smallholder farmers earn higher premiums after the initial period of organic production and that organic yields may actually be higher than conventional yield due to the better land quality management.

Most respondents, especially those in direct contact with farmer organisations, noted that certifying their farms adds value among other smallholder farmers. Harris *et al* (2001) explains that when smallholder farmers become certified, access to external markets is regarded as value addition to their farms. In their study, a respondent stated "this is not just added value; it is the difference between a market or not. To gain full certification enables a producer to secure a market." Certified organic farmers also gain value addition through the development of domestic markets (Harris *et al.*, 2001).

For smallholder farmers to achieve an international certification, they have an option of organising themselves into an established farmer organisation or cooperative with an internal control system of audit and control. Respondents indicated that social capital enables them to cooperate and achieve the accredited status and a functional internal control system. Social

capital with a *p* value of 0.000 shows that farmers regard the variable to be equally important. This result is confirmed by Harris *et al* (2001) who explains that social capital enables smallholder farmers to build up capacity in organisation, marketing and financial planning as well as share techniques for organic farming.

7.3.4.2 Perceived costs of certified organic farming

Organic certification incurs bureaucratic and economic costs Bravo *et al* (2012).Bureaucratic costs are costs related to the use of quality assurance schemes. Economic costs are a result of the implementation of the certification requirements. For example, the purchase of new irrigation systems, organic seeds and inspection fees are additional costs for the farmer (Dorr & Grote, 2009; Karipidis *et al.*, 2009). Schulze and Spiller (2010) in their study of farmer acceptance of the organic certification system reported that bureaucratic costs negatively affected organic farmers' satisfaction. Similar results have been reported by Jahn, Spiller, Theuvsen & Peupert (2007). The costs related to inspection is crucial for South African farmers as they depend on foreign agencies to obtain international accreditation, which increases their certification to unimaginable levels compared to their counterparts in Europe (Barrett *et al.*, 2002; Vogl, Kilcher & Schmidt, 2005). As a result, the following hypothesis is postulated as: *H_2: The higher the perceived costs, the lower the rate of farmer participation in certified organic farming.* Perceived costs were based on three variables; inspection costs, infrastructure costs and certification cost

7.4 STRUCTURAL EQUATION MODELLING

The aim of this chapter is to analyse farmer perception towards certified organic farming. In addition, it identifies factors that influence farmer participation. Ideally, the OLS model is applicable; however, in order to estimate causal relationships, structural equation modelling is appropriate. Structural equation modelling (SEM) is a general analytic framework that allows the identification of causal relationships through the combination of multiple regression and confirmatory factor analysis, Bravo *et al.* (2012). The estimation of causal models with latent constructs can be performed by either a variance or a covariance based SEM technique,Reinartz, Haenlein and Henseler (2009). SEM produces regression weights, variances, co variances and correlations in its iterative procedure converged on a set of

parameter estimates (Holmes-Smith, 2011). When estimating the SEM, Maximum Likelihood Estimation is used to make statistical inference. A structural equation model consists of a latent model relating the latent variables; which is represented as equation 7.1:

$$\eta = \propto_{\eta} + B_{\eta} + \Gamma\xi + \varsigma \qquad 7.1$$

and a measurement model linking the latent and the observed variables:

$$Y = \propto_{y} + A_{y}\eta + \varepsilon \qquad 7.2$$

$$x = \propto_{x} + A_{x}\xi + \delta \qquad 7.3$$

Where ξ are exogenous latent variables, ŋ are endogenous latent variables, x and y are indicators of the exogenous and endogenous latent variables, and ξ, ς, ε, δ are uncorrelated error terms (Yuan, 2007). The structural model defines the causal relationships between constructs or specifies how latent variables are related to each other. The measurement model, on the other hand, defines the portion of the model that specifies how the observed variables depend on the unobserved, or latent variables (Hair Jr, Anderson & Tatham, 1998; Gefen, Straub & Boudreau, 2000). The International Business Machines (IBM) AMOS software was used to estimate these models.

7.4.1 Measurement models

The measurement model uses factor analysis to assess the degree that the observed variables load on their respective constructs. In this study, however, factor analysis was not used as the sample was not large enough and variables measuring each construct were limited. Some of the variables used were adopted from previous studies but modified for this study's specific situation. Thus, not using factor analysis was not a problem since these variables had been used in previous studies (Bravo *et al.*, 2012). The variable loadings provided by SEM are analogous to a factor analysis, and each factor is a latent variable. Techniques in SEM assume that each variable has a unique measurement error, that is, a measure of inaccuracy in participant responses and their measurement and theoretical representation of the concept used in a given variable. This, however, is corrected by the use of covariance matrix as an input in the model for the analysis of a model having measurement errors (Hair Jr *et al.*,

1998). This then facilitates the transition from an exploratory to a confirmatory analysis. Confirmatory Factor Analysis (CFA) is used to test the adequacy of the measurement model since it is a prerequisite to structural models. CFA allows the researcher to test if conjectured relationships structures are supported by the observed data. It looks for the extent to which variables designed to measure a given factor actually do so.

7.4.1.1 Perceived benefits construct

Five items that included access to markets, better farming options, improved farm image, premium prices and social capital measured the construct perceived benefits. These items were subjected to a CFA, the results of which are provided in Table 7.5. Access to markets asked respondents to describe the types of markets they accessed and their perceived value. The markets identified where both domestic and international markets. The item, better farming option, asked if certified organic farming was a better farming enterprise than non-certified and conventional farming. The premium price was an item that evaluated farmers' perception towards commodity prices for certified products. CFA results indicate that the measurement model for perceived benefits is a good fit. Most of the fits indices exhibited higher loadings with a χ^2 of 120 (df=7 and p = 0.001). Results show that all items in this construct are statistically significant at 0.05.

Table 7.5: CFA for the perceived benefits construct

Exogenous variable	**Standardised factor Loadings**	**CR**	***P* value**
Premium prices	0.98	12.34	***
Access to markets	0.81	9.06	***
Better farming option	0.49	7.18	***
Improved farm image	0.97	11.90	***
Social capital	0.25		***
Achieved Fit Indices			
CMIN/DF	**RMSEA**	**IFI**	**CFI**
17.22 (120.554/7)	0.0478	0.941	0.956
Composite construct reliability = 0.91			

Standardised loadings explain the relationship with the latent variable perceived benefits. Premium prices with the highest standardised loading of 0.98; have a strong influence on farmer perception. The second highest item is improved farm image with a standardised loading of 0.97. Social capital does not have a strong influence on farmer perception under the construct of perceived benefits. The composite construct reliability for this five item measure is 0.91 which is above the acceptable level (Hair Jr, Anderson, Tatham & William, 1995). This implies that the five items are considered reliable as well as valid for the perceived benefits construct. All items of the perceived benefit construct have strong factor loadings and will be used to estimate the structural equation.

7.4.1.2 Perceived costs construct

Three items that included certification cost, inspection costs and infrastructure costs measured the perceived costs construct. The analysis of the inter-item correlation matrix indicated that there was no correlation between items. All three items were subjected to a CFA and results are displayed in Table 7.6 which indicates that the model is a good fit for the data and does not require any modifications as the cut off ranges of fit indices are above the recommended levels with a χ^2 value of 33.47, df = 2 and a *p* value of 0.000. The fit indices are reasonable CMIN/DF and RMSEA are above expectation. The item of inspection costs indicated an error of covariance which suggested misspecification, however, the measurement model fit statistics showed a relatively good fit.

Table 7.6: CFA for perceived costs construct

Exogenous variable	**Standardised factor loadings**	**CR (t)**	***P* value**
Inspection costs	-0.563	3.874	***
Infrastructure costs	0.717	5.936	***
Certification costs	-0.68		***
Achieved Fit indices			
CMIN/DF	**RMSEA**	**IFI**	**CFI**
16.738(33.476/2)	0.024	0.962	0.910
Composite Construct Reliability 0.83			

All items in the perceived costs constructs are statistically significant at 0.05 per cent. Perceived infrastructure costs have the highest factor loading of 0.717, which implies that these costs affect farmer perception the most. Farmer perception of certification costs and inspection costs are relatively low, -0.680 and -0.563 respectively. Although these factor loadings may be relatively low compared to that of infrastructure costs, they will be used to explain farmer participation in the structural model. They have a good fit and are highly significant from a statistical point of view. The composite reliability score for this measure is 0.83.This signifies that these items are considered reliable for this measure.

7.4.2 Structural Model Results

All measures that were statistically validated during the CFA in the measurement are used to construct the structural model. The structural model had two factor measures, which are perceived benefits and perceived costs. Perceived benefits had five items and perceived costs had three items.

7.4.2.1 Goodness of Fit of the structural model

The assessment of goodness of fit for the model focuses on R^2 scores, size and sign, and the significance of the path coefficients Baumgartner and Homburg (1996). A good fit for a structural model is identified when (i) there are statistically significant t-values associated with the path coefficient estimates and (ii) there is a high explanatory power (R^2). The structural model explained 77 per cent of the variance in the perceived benefits of certified organic farming and 41 per cent of perceived costs associated with certified organic farming. The R^2 coefficients of all measures are strong and acceptable.

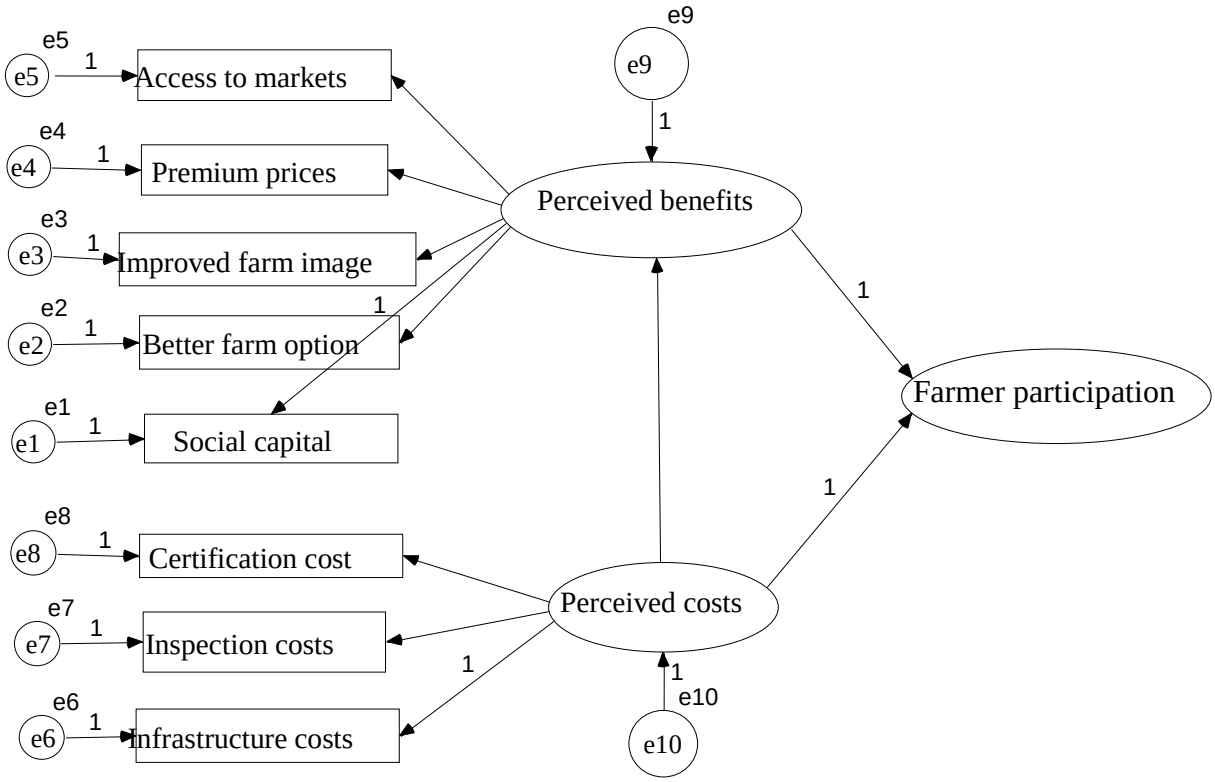


Figure 7.1: The structural model of farmer perception and its effect on farmer participation

The structural model had a χ^2 value of 73.544, with degrees of freedom of 20 and a *p* value of 0.000 which indicates a good fit of the model. Figure 7.1 summaries the final structural model with standardised regression coefficients. Fit indices all indicated a good fit of a model, CMIN/DF (3.677), RMSEA (0.019), IFI (0.910) and CFI (0.908). All these indices are above the expected level of standard scores, which explain the data in the model, making the structural model a good fit model. The significance of the path estimates (Table 7.7) was determined by use of Amos Maximum Likelihood.

Table 7.7: Structural path estimates

Exogenous variables	Endogenous construct	Parameter estimate	Standard error	*t*-statistic (CR)
H_1 Perceived benefits				
Premium prices	Farmer participation	0.996	0.438	14.720*
Access to markets	Farmer participation	0.851	0.086	10.049*
Better farm option	Farmer participation	0.878	0.150	6.804*
Improve farm image	Farmer participation	0.973	0.094	13.730*
Social capital	Farmer participation	0.871		
H_2 Perceived costs				
Certification cost	Farmer participation	-0.719	0.016	-7.512*
Inspection costs	Farmer participation	-0.578	0.181	-4.903*
Infrastructure cost	Farmer participation	0.855		

*Parameter is significant at $P<0.05$

7.4.3 Factors influencing farmer perception

Overall, results show that farmers' perceptions of certified organic farming are positive. In other words, the perceived benefits of certified organic farming meet farmers' expectations. Previous empirical evidence indicates that farmers' acceptance of organic certification is higher and less controversial in developing countries (Albersmeier, Schulze &Spiller, 2009). Results further reveal that among the perceived benefits, the perceived premium prices obtained from selling certified organic commodities shows a significant influence on farmers' perceptions. This variable has the highest impact (0.996) on perception in the model. The perception that certified organic farming improves a farmer's farm image also ranks second in the positive impact on farmer perception. The findings show that the perceived benefits are more important than the perceived costs. Similar studies have reported similar results in the organic food industry (Bravo *et al.*, 2012).

The perceived premium prices of certified organic products are the most important factor affecting farmer perception. This is not unusual because South Africa's organic production is

mainly focused on exportation and targets high value markets. Studies from (Bravo *et al.*, 2012; Dorr and Grote, 2009) also report that farmers who have adopted certification schemes (or who participate in certified organic farming) have higher net incomes compared to non-certified farmers. In addition, some previous studies indicate that farmers' perceptions of the benefits of certified organic farming increase their need to maintain a certified form of farming (Harris *et al.,* 2001). Studies by Harris *et al.* (2001) reveal that organic premium prices are calculated at a percentage that is higher than the price of conventional products. In their study, they argue that without creating such opportunities for smallholder farmers, it would be difficult to motivate them to become involved in certified organic farming.

The findings also reveal that other potential benefits such as market access and social capital have a strong influence on farmers' perceptions. Market access and strong networks on farmer groups promote the adoption of certified organic farming (Barret *et al.*, 2002). If policy makers endeavour to improve the farming environment and further encourage the adoption and acceptance of certified organic farming in South Africa, then these benefits should be properly communicated to farmers.

As hypothesized, the costs associated with the certification process, that is, inspection costs (-0.578); annual certification costs (-0.719) negatively affect farmers' perceptions. This is not surprising especially for inspection costs where farmers often argue that they pay high costs to accommodate inspectors from European or North American countries where farmers intend to export their organic products. Inspection costs include allowances, accommodation, and travel for an inspector to come and inspect farms. Previous studies have shown similar results (Bravo *et al.*, 2012; Jahn and Spiller, 2007; Schulze and Spiller, 2010).

These studies recommend the use of farmer associations to reduce such costs because it then allows economies of scale and reduces transaction costs. Bravo et al. suggest that developing countries should regard equivalence of organic laws and standards. As an example, Barret suggests that if countries are recognised as 'Third World' by European Union organic legislation, then he export process should be facilitated by reducing costs (Barret *et al.*, 2002). South Africa is not a third world country but may in turn consider the harmonization of organic laws with countries regarded to have high value markets. The integration of

organic standards would help guarantee the participation of farmers in international organic markets and promote sustainable development of organic farming.

Another way to reduce certification related costs and consequently improve farmer participation is to encourage foreign certifiers to develop their capacity in the country. The South African government has to provide an enabling environment by developing organic laws and standards to combat costs such as inspection costs that could be significantly reduced. This would enable farmers to have a positive perception towards certified organic farming. The certification related costs identified in this study do not exhaust all costs involved in a certification process and these may not exert a significant effect in a different farming environment. Thus, future studies should incorporate more cost variables associated with the certified organic farming into the analysis. This may provide a better understanding of the impact of costs on farmer participation.

7.5 SUMMARY

This chapter has shown that farmer perception is an important aspect in encouraging farmers to participate in certified organic farming. Using SEM, the study identified factors that influence farmer perception in a smallholder farmer setting. Two measurement models of perceived benefits and perceived costs were assessed with the help of Confirmatory Factor Analysis (CFA); which identified the relevant variables that were statistically suitable to predict farmer perception. In the perceived benefits construct, items such as premium prices, market access, better farming options, an improved farm image and social capital were used. The construct of perceived costs, certification cost, inspection cost and infrastructure costs were identified. A structural model was later estimated based on variables from the measurement models.

According to the findings, organic farmers have a strong positive perception of certified organic production. Perceived benefits have been shown to be more important factors of farmer perception, as the perceived premium prices of certified organic products is the most important variable driving farmer participation. Perceived costs are also regarded as important, especially the perceived certification costs and inspection costs. Annual

certification costs are the central barrier to farmer participation in certified organic farming. In this context, government may play a central role in reducing such costs. For example, they could negotiate equivalence of the organic laws and standards with countries regarded to have niche markets for organic products. In this way, farmer participation in certified organic farming may increase. Encouraging foreign certifiers to develop their capacity in the country may also help to increase farmer participation.

CHAPTER 8: SUMMARY AND CONCLUSIONS

8.1 INTRODUCTION

This Chapter summarises the salient findings of this dissertation and how it addressed the hypotheses specified in Chapter 1. The study's shortcomings, need for further research and the applicability of the study's findings to smallholder organic farmers in South Africa are discussed. Recommendations based on lessons learnt from the research and study findings are suggested for organic farming practitioners, agricultural research institutions and as well as the South African Government.

8.2 SUMMARY

The South African smallholder organic experience has been the only example of where subsistence crops produced by subsistence farmers aim at global food markets. South African smallholders' experience with organic farming is thus a great interest to amongst others African decision makers and international food, agricultural and development organisations. Research and literature on organic farming, quality standards and its implications to smallholder farmers is scare and the current existing international body of literature is limited to production and trade possibilities. Current publications' findings are limited an inconclusive because the analyses are rarely based on implications of quality food standards and farmers' perception towards these safety standards. This thesis is a substation improvement on previous work in that it uses data collected from 2009/2010. This thesis comprehensively answers the general research hypothesis: Taking into consideration the immerse certification procedures in certified organic farming, low farmer participation is as a result of poorly defined economic benefits as well as a possible complicated and frustrating certification process for farmers.

The first part of the study supplied background information on organic farming, defining the concept of organic farming, explaining the origins of organic farming and the extent of organic farming in developing nations. Peer reviewed international literature shows that the extent of organic farming in developing nations has been increasing for the past ten years, and more government initiatives are being introduced to increase supply of organic products. The next

part of the study set the scene for the analytical sections by describing and reviewing the economic studies under organic farming, implications of quality standards on smallholder farmers, the dynamics in organic markets and the relationship between certification and access to international markets. The profitability and costs of certification, factors that affect farmer viability in organic farming where discussed. The farm-level implications of certification and / or quality standards where discussed by comparing impacts from other countries and based on the experience with similar procedures in their organic farming systems.

The third section of the study discussed the organic farming industry in the South African context highlighting what organic production represents for smallholder producers, the certification mechanisms in the study area, different certification options, their benefits and drawbacks for smallholder farmers and the nature of the actual certification process in South Africa. The fourth section developed a conceptual and theoretical model for farmer participation in certified organic farming. The general question in this section was: What economic conditions can enable a farmer to maximise their utility under certified organic production. In summary, the section concluded that participation of farmers in certified organic farming could be higher, if certified organic farming provided lower costs of inputs, which leads to a higher utility for the farmer in the long run. In order to analyse the determinants of farmer participation in certified organic farming, section five discussed the characteristics of smallholder organic farmers in the study area.

Several variables where identified and analysed in context with other studies and were categorised as demographic and socio-economic, knowledge and information, and membership to farmer groups. The variable, age of the farmer as one of the important factors in the agricultural sector is often used as a proxy to determine the experience and interest of a farmer. The average age of farmers was forty-five years indicating that the majority of farmers are still in their active years. One of the reasons that may account for this age pattern might be that at forty-five years, some respondents considered certified organic farming as a lucrative income generating activity. Gender distribution revealed that there were more female-headed farms than male-headed farm holdings. Education is one of the essential aspects that can enable a farmer to easily understand basic farm management, agricultural marketing principles and the ability to create business networks. In other words, education increases the competence of a

farmer in generating income. Knowledge, information access and membership to farmer organisations were found to be highly significant.

The sixth section of the study discussed the determinants of farmer participation in certified organic farming. Three models where simulated to obtain a more conclusive model that identifies actual factors influencing farmer participation. A final model which included most of the identified variables was highly significant. Three of the model variables were positively associated with the probability of participating in certified organic farming. The age of the farmer, membership to a farmer organisation and market premium prices for certified commodities. The other five significant factors were negatively associated with the probability of participating in certified organic production. Age is a positive factor. The study implies that for every one year increase in the age of a farmer, the probability that a farmer will participate in certified organic farming will increase by 1.22. Many participation studies have confirmed the role that age plays in the participation decision of farmers.

Membership to farmer organisations also has a considerable effect on farmers' participation. This result calls for farmers to subscribe to cooperatives, community farmer groups and other related agricultural groups. The effect is high because in farmer groups, access to certification is easier and the presence of an internal control system enables proper adherence to certification requirements. Premium market prices for certified commodities has a higher marginal effect, meaning that more access to premium prices for certified products might increase the chance of farmers getting interested in certified organic production. Typically, access to better market prices will encourage farmers to produce more certified products through getting certification and adhering to certification requirements.

The results indicate that the marginal effect of certification costs on the likelihood of farmers, certifying their farms is a major negatives factor. That is, every additional cost in the certification process will decrease the probability of a farmer participating in certified organic farming. Certification is a basic requirement for farmers to be associated with certified organic producers, but its costs are relatively high for smallholder farmers. In South Africa, farmers are certified by mostly European and North American certifiers because South Africa has no organic certification laws. Thus, the government cannot develop a certification system, and the implication for this is that farmers pay for accommodation, allowances and inspection fees for

examiners from Europe and North America. These certification related costs deter farmers from engaging in certified organic production and it ultimately lowers their participation. This result should inspire the government to speed up the process of developing a stand-alone policy on the certification of organic production.

The variable gender is significant which implies that for every one addition to the number of male farmers, the decision to participate in certified organic farming will be reduced by 1.724. Thus, female farmers are more positive about participating in certified organic farming than their male counterparts. This result is similar to other studies that found that female farmers usually perceive such activities as a means of meeting basic needs and also as a support mechanism for increasing self-reliance. Farm income with a -0.214 coefficient has a negative effect on participation. This result implies that a farmer's income does not improve the ability of a farmer to become a certified producer. Furthermore, it implies that when farmers have access to a non-farm income, they may not necessarily decide to participate in certified organic production since non-farm income can function as a substitute for the better incentives in certified organic production.

Scholars studying farmer participation also find the variable of farming experience to be of primary importance in explaining farmers' participation. However, study results are not always consistent. In this study, farmer experience with a -0.219 coefficient has a negative relationship with farmer participation. A possible explanation that can be advanced for this is that, farmers with a relatively low level of farming experience are likely to have less knowledge and information on organic farming and certification requirements. These farmers are usually young and with a low level of farming, experience the probability of participating in certified organic farming is low. One other important variable that is constraining farmers is access to information in terms of organic production, marketing information and certification processes.

Section seven of the study analysed farmer perception of certified organic farming and its subsequent effect on the participation decision. results show a significant level of farmer perception with certified organic farming to be positive. In other words, the perceived benefits of certified organic farming meet farmers' expectations. Previous empirical evidence indicates that farmers' acceptance of organic certification is higher and less controversial in developing countries. Results further reveal that among the perceived benefits, the perceived premium

prices obtained from selling certified organic commodities shows a significant influence on farmers' perceptions. This variable has the highest impact (0.996) on perception in the model. The perception that certified organic farming improves a farmer's farm image also ranks second in the positive impact on farmer perception. The findings show that the perceived benefits are more important than the perceived costs. Similar studies have reported similar results in the organic food industry.

Perceived premium prices for certified organic products was the most important factor affecting farmer perception. This is not unusual because South Africa's organic production is mainly focused on exportation and targets high value markets. Similar studies also report that farmers who have adopted certification schemes (or who participate in certified organic farming) have higher net incomes compared to those of non-certified farmers. The findings also reveal that other potential benefits such as market access and social capital have a strong influence on farmer perception. Market access and strong networks on farmer groups promotes the adoption of certified organic farming. If policy makers endeavour to improve the farming environment and further encourage the adoption and acceptance of certified organic farming in South Africa, then these benefits should be properly communicated to farmers. As hypothesized, the costs associated with the certification process, that is, inspection costs (-0.578) and annual certification costs (-0.719) negatively affect farmer perception. This is not surprising especially for inspection costs where farmers often argue that they pay high costs to accommodate inspectors from European or North American countries where they intend to export their organic products. The study used a sample of only organic farmers and certified organic farming which was quite limiting in having conclusive results,

8.3 STUDY LIMITATIONS AND FUTURE RESEARCH

As indicated above, it is thought that this study could have benefited from the involvement of all smallholder farmers other than only farmers growing organic crops. A perception study would have provided more insights and results if conducted within a population including smallholder farmers not yet involved with organic farming. However, the biggest limiting factor in this study is the small sample size as linked to the small organic farming population. In a number of seasons, farmers struggle to obtain certification, organic farming infrastructure and plant material. This was partly due to the complicated process of certification which takes

several years to obtain. In 2010 close to the total population of organic farmers were surveyed but with farmers also opting for conventional farming, the number of farmers in the study area become too small despite a small percentage of new farmers. This had an adverse impact on the statistical significance of a number of findings. In order to address this, an effort was made to survey the same farmers to remove some farmer specific variation and it is argued that though some findings were not found to statistically significant, substantial differences cannot be discarded.

A number of variables were collected in this study but not analysed to a satisfactory level. These required more in-depth research and analysis. Some of these include: adoption analysis, gender related issues, labour use analysis especially in the conversion period, implication of certification to smallholder farmers, modelling if certification creates an exclusive organic farming population. All these issues require panel data analysis. An important issue not reported on in this thesis is the question of whether the certification actually benefits smallholder farmers. The focus area of the study (Limpopo) is not ideal to test this hypothesis as the sample of farmers is not representative of South Africa. Future research will test these hypotheses by also analysing data collected in a larger sample that includes all smallholder farmers.

8.4 OBSERVATIONS, LESSONS AND RESULTINGRECOMMENDATIONS

This study stretched for over a nine months period. Throughout this period, a number of observations were made and lessons learnt. Some of the lessons learnt might be useful to other practitioners studying public-private standards and their implications to smallholder farmers. Critical lessons learnt were using Provincial agricultural extension officers, as enumerators, living in the community greatly benefitted the study. As extension officers know the area and are known by the community, they were able to find farmers and farmers generally trusted them with household information. Extension officers were able to supply additional information on the area, community, events, concerns and perceptions regarding seed types and input suppliers. This type of information is not easily captured in a general questionnaire. By employing people from the area, farmers also saw the study as beneficial to the community and this further added to the sentiment of good-will and cooperation.

By visiting farmers a number of times through the season, data collected as production activities took place, but enumerators were also able to return to farmers with earlier questionnaires that had been reviewed to correct, confirm and collect additional information on interesting or questionable answers. This ensured accurate and contextualised data. The collaboration of provincial Department of Agriculture extension officers was vital in the planning, implementation and running of the surveys as well as in interpretation of survey answers and explanation of anomalies.

8.4.1 Conclusions

This study explored and discussed a farming initiative for farmers in the Limpopo Province where certified organic farming was suggested as a farming alternative to promote a structural change to assist farmers to move from a subsistence type of farming towards a more market-oriented structure. A probit analysis revealed the conditions that would most likely encourage farmers to participate in that farming option. Farmers who had benefited from certified organic farming through premium prices for their certified organic products tended to be more positive. It was found that the most important factor in encouraging participation in certified organic farming was the assurance that a farmer would increase their revenue through lucrative premium prices for their organic products. Farmer perception was also identified as an important aspect that might influence farmer participation. Perceived benefits are regarded as important, but perceived costs also influence farmers significantly. Previous studies indicate that farmers' perceptions of the benefits of certified organic farming increases their need to maintain a certified form of farming.

More informed farmers were seemingly more inclined to certify their farms as they assessed better impacts of the farming option. Farmers who are not members of a farmer group or farmer cooperative are not well informed about certified organic farming and may overestimate the costs involved and undervalue the benefits of the farming option. Gender in this study is not an important variable, but the age of the farmer is a significant factor as older farmers more readily participate in certified organic farming. Organic agricultural policies are vital in this case as they improve the needed technical assistance to farmers. This strengthens farmers' participation in certified organic farming. With reference to the findings above, smallholder farmers need government support in order to participate in certified organic farming. Farmers

need a combination of information and technical assistance that may encourage them to become involved in certified organic farming. These findings indicate that more incentives should be provided to farmers in order to encourage them to participate at social, economic and institutional levels. This paper has been written as an attempt to initiate discussion on the issue of farmer participation in certified organic farming in South Africa. Government will have to create direct benefits linked to farming and they need to minimise the costs of farming to encourage more participation in certified organic farming.

In conclusion, a combination of factors does influence a farmer's decision to participate in certified organic farming. One cannot rely only on specific factors to determine farmers' participation in certified organic farming. Farmer perception of certified organic farming is also an important aspect. The more farmers positively perceive the farming enterprise, the higher the rate of participation. Unfortunately, the perceived costs have a negative impact on participation.

8.4.2 Recommendations

A couple of recommendations are made based on study results, to the organic farming community, policy makers and the South African Government. It is recommended that the government completes and puts into practice the South African organic regulation which may motivate farmers to get involved in certified organic farming. However, in order to tackle the current situation, government should emphasise the need for self-regulation within farmer groups and cooperatives for organic production, and they should appoint a regulator to monitor current organic farming activities. This would enhance interest from potential farmers and strengthen consumer confidence.

There is very little information about organic farming in South Africa. Those articles that are available are, for the most part, unpublished and not peer reviewed. This should be improved by encouraging more research in the area of organic farming, which can enable farmers, consumers and regulators to access data on the socio-economic, production, and trade in the industry. This would assist stakeholders that desire to assist the industry to target the relevant players and production areas of the industry. It would also assist farmers and other firms in the organic supply chains to find out who to contact and for which purposes, and would help

producers to get direct access to market information on matters such as trends and potential consumers. There is a need for the government to support the partnership between farmers and processors in their efforts to establish cost effective processing of organic products and to increase the availability of processed products for markets. Government should assist non-certified smallholder organic farmers to become certified. This could result in a price premium for their products and enhance their export possibilities.

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APPENDIX 1: Farmer demographic variables

Frequency distribution for variable age

Age		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	<30	2	2.8	2.8	2.8
	31-40	14	19.4	19.4	22.2
	41-50	32	44.4	44.4	66.7
	51-60	11	15.3	15.3	81.9
	>60	13	18.1	18.1	100.0
	Total	72	100.0	100.0	

Frequency distribution for variable gender

Gender		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	Male	28	38.9	38.9	38.9
	Female	44	61.1	61.1	100.0
	Total	72	100.0	100.0	

Frequency distribution for variable Education

Education		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	No education	14	19.4	19.4	19.4
	Primary education	27	37.5	37.5	56.9
	Secondary education	16	22.2	22.2	79.2
	Certificate	11	15.3	15.3	94.4
	Diploma	3	4.2	4.2	98.6
	Other	1	1.4	1.4	100.0
	Total	72	100.0	100.0	

Frequency distribution for variable farmer experience

Farmer Experience		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1year	3	4.2	4.2	4.2
	2years	3	4.2	4.2	8.3
	3years	10	13.9	13.9	22.2
	4years	3	4.2	4.2	26.4
	5years	9	12.5	12.5	38.9
	>5years	44	61.1	61.1	100.0
	Total	72	100.0	100.0	

APPENDIX 2: Information access variables

Cross Tabulation of Farmer Organization and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
Farmer Organization	Yes	Count	42	13	55
		% of Total	58.3%	18.1%	76.4%
	No	Count	11	6	17
		% of Total	15.3%	8.3%	23.6%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of Farmers and Organic Production

Variable			**Organic Production**		**Total**
			Certified participants	**Non-certified participants**	
Farmers	Yes	Count	46	17	63
		% of Total	63.9%	23.6%	87.5%
	No	Count	7	2	9
		% of Total	9.7%	2.8%	12.5%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of NGO and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
NGO	Yes	Count	19	6	25
		% of Total	26.4%	8.3%	34.7%
	No	Count	34	13	47
		% of Total	47.2%	18.1%	65.3%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of Retailer and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
Retailer	Yes	Count	6	2	8
		% of Total	8.3%	2.8%	11.1%
	No	Count	47	17	64
		% of Total	65.3%	23.6%	88.9%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of Magazine/Books and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
Magazine/Books	Yes	Count	4	1	5
		% of Total	5.6%	1.4%	6.9%
	No	Count	49	18	67
		% of Total	68.1%	25.0%	93.1%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of Neighbour and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
Neighbour	Yes	Count	19	8	27
		% of Total	26.4%	11.1%	37.5%
	No	Count	34	11	45
		% of Total	47.2%	15.3%	62.5%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

Cross Tabulation of Extension Officer and Organic Production

Variable			Organic Production		Total
			Certified participants	Non-certified participants	
Extension Officer	Yes	Count	48	14	62
		% of Total	66.7%	19.4%	86.1%
	No	Count	5	5	10
		% of Total	6.9%	6.9%	13.9%
Total		Count	53	19	72
		% of Total	73.6%	26.4%	100.0%

APPENDIX 3: Farmers' perception

Frequency distribution of Perceived benefits by Age

Variable		Age					Total
		<30	31-40	41-50	51-60	>60	
Perceived benefits	Yes	2	12	25	9	8	56
	No	0	2	7	2	5	16
Total		2	14	32	11	13	72

Frequency distribution of Perceived benefits by Gender

Variable		Gender		Total
		Male	Female	
Perceived benefits	Yes	22	34	56
	No	6	10	16
Total		28	44	72

Frequency distribution of Perceived access to markets by Age

Variable		Age					Total
		<30	31-40	41-50	51-60	>60	
Access to markets	Yes	2	12	23	8	10	55
	No	0	2	9	3	3	17
Total		2	14	32	11	13	72

Frequency distribution of Perceived access to markets by Gender

Variable		Gender		Total
		Male	Female	
Access to markets	Yes	26	29	55
	No	2	15	17
Total		28	44	72

Frequency distribution of Perceived better farming option by Age

Variable		Age					Total
		<30	31-40	41-50	51-60	>60	
Better farming	Agree	1	7	19	9	7	43
	Disagree	1	7	13	2	6	29
Total		2	14	32	11	13	72

Frequency distribution of Perceived better farming option by Gender

Variable		Gender		Total
		Male	Female	
Better farming	Agree	22	21	43
	Disagree	6	23	29
Total		28	44	72

Frequency distribution of Perceived improved image of the farm by Age

Variable		Age					Total
		<30	31-40	41-50	51-60	>60	
improved image	Agree	1	8	16	3	7	35
	Disagree	1	6	16	8	6	37
Total		2	14	32	11	13	72

Frequency distribution of Perceived improved image of the farm by Gender

Variable		Gender		Total
		Male	Female	
improved image	Agree	10	25	35
	Disagree	18	19	37
Total		28	44	72

Frequency distribution of Perceived strict requirements and high input costs by Age

Variable		Age					Total
		<30	31-40	41-50	51-60	>60	
High input costs	Yes	1	12	25	9	10	57
	No	1	2	7	2	3	15
Total		2	14	32	11	13	72

Frequency distribution of Perceived strict requirements and high input costs by Gender

Variable		Gender		Total
		Male	Female	
High input costs	Yes	25	32	57
	No	3	12	15
Total		28	44	72

Perceived benefits and organic producers

Variable			Organic Production		Total
			Certified participants	*Non-certified participants*	
Perceived benefits	Yes	Count	44	12	56
		% of Total	61.1%	16.7%	77.8%
	No	Count	10	6	16
		% of Total	13.9%	8.3%	22.2%
Total		Count	54	18	72
		% of Total	75.0%	25.0%	100.0%

Access to markets and organic producer

Variable			Organic Production		Total
			Certified participants	*Non-certified participants*	
Access to markets	Yes	Count	47	8	55
		% of Total	65.3%	11.1%	76.4%
	No	Count	7	10	17
		% of Total	9.7%	13.9%	23.6%
Total		Count	54	18	72
		% of Total	75.0%	25.0%	100.0%

Better farming and organic producers

Variable			Organic Production		Total
			Certified participants	*Non-certified participants*	
Better farming option	Agree	Count	31	12	43
		% of Total	43.1%	16.7%	59.7%
	Disagree	Count	23	6	29
		% of Total	31.9%	8.3%	40.3%
Total		Count	54	18	72
		% of Total	75.0%	25.0%	100.0%

Improved image and organic producers

Variable			Organic Production		Total
			Certified participants	*Non-certified participants*	
Improved farm image	Agree	Count	23	12	35
		% of Total	31.9%	16.7%	48.6%
	Disagree	Count	31	6	37
		% of Total	43.1%	8.3%	51.4%
Total		Count	54	18	72
		% of Total	75.0%	25.0%	100.0%

High input cost and organic producers

Variable			Organic Production		Total
			Certified participants	*Non-certified participants*	
High input costs	Yes	Count	46	11	57
		% of Total	63.9%	15.3%	79.2%
	No	Count	8	7	15
		% of Total	11.1%	9.7%	20.8%
Total		Count	54	18	72
		% of Total	75.0%	25.0%	100.0%

Test Statistics for farmer perception variables

Test Statistic	Perceived benefits	Access to markets	Better farming	improved image	High input costs
Chi-Square	22.222	20.056	2.722	0.056	24.500
Degrees of freedom	1	1	1	1	1
P value	0.000	0.000	0.099	0.814	0.000