Smallholder farming styles and development policy in South Africa: The case of Dzindi Irrigation Scheme

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Abstract

Diversity among smallholders farming 1.28 ha plots at Dzindi Irrigation Scheme in the Thulamela Local Municipality of Limpopo Province, South Africa is investigated by applying farming style theory. Farming styles refer to specific farming strategies, which are conscious responses of farmers to the prevailing ecological and socio-economic conditions. The specific objectives of the study were to identify and characterize styles of farming in the Dzindi community of smallholders, to provide an understanding of the different styles from a smallholder perspective, and to interpret the meaning of the findings for smallholder development policy. Data collection involved both quantitative and qualitative methods. Three main farming styles were identified, and in each of these farmers employed particular strategies, which were congruent with their farming objectives, and which represented different degrees of exposure to risk evidenced by the crop selection, the amount of land they planted, the service providers they used with specific reference to land preparation, the social networks they maintained, especially with regard to marketing produce, the labour they hired and the farming requisites they purchased and utilised. The findings suggest that the response by farmers in the different styles to contemporary agricultural and related policy aimed at their empowerment and commercialisation is unlikely to be uniform, and this is expected to dilute the impact of policy measures in support of specific development trajectories.

1.   Introduction

Generally, the challenge for South African smallholder development policy is understood to be the creation of conditions necessary to motivate and enable smallholders to progress from subsistence to commercial producers, a process referred to as smallholder empowerment (Makhura *et al*, 1996; Department of Agriculture, 2001:8 and Backeberg, 2003:165). Using a study of diversity among smallholders at an irrigation scheme this article investigates to what extent farmers aspire to progress in this way. The specific objectives of the study were to identify and characterize styles of farming in a community of smallholders,

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to provide an understanding of the different styles from a smallholder perspective, and to interpret the meaning of the findings for smallholder development policy.

2.   Review of literature

2.1   Smallholder diversity in South Africa

During the decade following the democratisation of South Africa in 1994, agricultural policy has aimed to create a new unified agricultural economy, in which both large and small farm enterprises compete harmoniously on local and international commodity markets (Department of Agriculture, 2001:3). An important concern has been the development of a black commercial smallholder sector (Vink and Kirsten, 2003:18). Smallholders in South Africa form a large and diverse group. Niewoudt (2000) estimated that there were about 2.1 million black small-scale farmers in South Africa in 1999. Diversity among them was studied by Bembridge (1987); Nieuwoudt and Vink (1989); Eckert and Williams (1995); Makhura *et al* (1998); Essa and Nieuwoudt (2003) and Shinns and Lyne (2005), among others.

In post-apartheid South Africa, smallholders are commonly categorised into three groups, namely 'subsistence farmers', who make up the large majority, 'commercial farmers', a small minority, and a third group called 'emerging farmers' (Department of Agriculture, 2001:5,8). The concept of 'emerging farmer' is understood to refer to farmers who have a 'desire' to increasingly commercialise their production (Niewoudt, 2000).

Within limits, the three categories of smallholders are seen as representing evolutionary steps on a linear development trajectory from subsistence farmer via emerging farmer to commercial farmer (Makhura *et al*, 1996). Intimately linked to the view that diversity among smallholders represents the different stages of a trajectory from subsistence to commercial farming is the construct of what constitutes success in smallholder farming. The discourse of several contemporary agricultural economists depicts a successful smallholder as a highly productive farmer who actively participates in markets and earns sufficient cash income, primarily from agriculture, to enjoy a life style that is free of poverty (Makhura *et al*, 1996; Du Plessis *et al*; 2000 and Essa and Niewoudt, 2003). In the case of irrigated agriculture successful smallholders are able to contribute financially to the operation and maintenance of infrastructure and the use of water (Backeberg, 2003:162).

2.2   Farming styles theory

Farming styles theory was developed by Jan Douwe Van der Ploeg and co-workers at the Department of Rural Sociology at Wageningen University in the Netherlands (Vanclay *et al*, 1998), and has mainly been used to study, characterize and explain diversity in farming within particular sub-sectors of agricultural production in Europe (Van der Ploeg, 1994 and Roep and De Bruin, 1994). A farming style is an integrating concept that portrays a particular way of practising agriculture. It is an expression of how farmers combine and order the elements that are used in the process of agricultural production (Van der Ploeg, 2003:101). For policy development farming styles are particularly useful, because they provide insights into the real world of agriculture as farmers experience it.

Farming styles occur and can be studied in different inter-related domains, including strategic, structural, social and cultural. In the strategic domain farming styles represent different decision-making models. In each style this model is based on a coherent set of strategic notions held by farmers about the way agricultural production should be practised. These strategic notions respond to cost-benefit relationships that have been determined empirically by farmers (Van der Ploeg, 2003:111). In the structural domain a farming style represents an internally consistent and congruous application of specific production practices, techniques and resources (Van der Ploeg, 2003:111). A specific style arises from a selection of farm projects that are implemented in favour of other projects, which are not executed. The projects that are implemented are ordered into a workable model for income generation.

In the social domain a farming style reflects the interaction of farmers with the external world through relationships with other actors featuring in the farming sector, such as other farmers, suppliers of services and goods, traders, government and society at large. Developing and sustaining these various relationships is an active process, which becomes increasingly demanding as production becomes more market dependent (Van der Ploeg, 2003:104).

In the cultural domain a farming style represents a repertoire (Van der Ploeg, 2003:111), a particular way of practising agriculture that is adapted to local agro-ecology, available technology and markets. A cultural repertoire is a store of indigenous knowledge that is shared and reproduced among farmers, and that acts as a normative framework guiding the handling of land and the objects of farming (Van der Ploeg, 2003:89). It is an open knowledge system that is continuously subjected to feedback, resulting in its affirmation or triggering its modification (Van der Ploeg, 2003:111).

Farming styles research in Europe and Australia has been conducted among populations where agriculture was at the core of the livelihoods of participants, and deriving adequate income from farming was the overall objective in all the farming styles that were identified. In the South African smallholder world the overall objective of farming is not necessarily the generation of monetary income. Reasons for farming may vary from making a partial contribution to the food requirements of farming families to providing full livelihoods (Fraser *et al*, 2003). As a result, strategically, diversity among smallholder farming styles is expected to reflect the differing objectives of farming. When farming forms part of a broader livelihood strategy, which also includes non-farming projects, as is the case among the majority of rural people in South Africa, the structure characterizing different farming styles is expected to be the result of an integration of all livelihood projects.

3.   Methodology

3.1   Approaches to the study of smallholder diversity

The study of diversity in populations, such as smallholder communities is essentially a search for compromise between the need to categorise reality in order to make sense of it, and the reality, which shows each element in the population to be unique in some way. Imperfections arising from compromise can be contained by clearly defining the purpose of the categorisation.

The spectrum of approaches to the study of smallholder diversity has the quantitative and the qualitative approach as its extremes. In the quantitative approach diversity is studied using a finite number of variables, and categorisation arises from a statistical analysis of these variables. The main quantitative methods used to categorise farmers are cluster analysis (Makhura et al, 1998) and principal component analysis (Niewoudt and Vink, 1989; Essa and Niewoudt, 2003).

A key strength of the quantitative approach is that existing theory explaining variability within a particular population can be built into the selection of variables for investigation, thus enabling the use of diversity studies for theory testing. Another is that differentiation among categories is based on objective criteria rooted in probability theory. Weaknesses of the quantitative approach are that deductive decisions on data collection may be based on an incomplete theoretical framework, causing important factors explaining diversity to be ignored (Bullock *et al*, 1994), and that the categories that are identified often lack meaning for farmers themselves, posing questions about the practical value of the categories for development purposes.

Qualitative approaches are inductive, subjective to varying degrees, and concerned primarily with actor perspectives. Categorisation tends to focus on identifying and describing what is typical for the different categories rather than defining the boundaries that separate the groups. As a result, data collection methods tend towards the participatory (Vanclay *et al,* 1998).

The main strength of a qualitative, actor-oriented approach is that farmers identify with the groups. One of the main criticisms is that perceived differences may not be measurable, raising questions about the validity of the outcomes.

Farmer diversity may also use a hybrid approach in which quantitative and qualitative methods are combined to address some of the weaknesses associated with either (Van der Ploeg, 2003).

3.2   Approach and methods used in this study

A hybrid approach was used in the conduct of this study. Clusters or linear patterns of plots were identified visually on a scatter diagram that related gross margin to total variable costs for each plot. These two variables were selected because they represented as it were the financial balance sheet of the different plot enterprises. Since the plots were identical in size, cluster or linear patterns in the distribution of data points on the scatter diagram were assumed to be an expression of differences in farming styles. Once these clusters or linear patterns had been identified, key variables that appeared to explain the relative position of the clusters or patterns on the graph were identified in order to quantitatively define the different farming styles. The existence of these styles was subsequently verified with farmers in a mass meeting. At this meeting farmers allocated *Tshivenda* names to the different styles, contributing to a shared understanding of what the different farming styles represented in practice. The procedure that was followed lacked the scientific rigour and the absence of bias and subjectivity that characterize other categorisation procedures, such as cluster analysis and especially principal component analysis, but it had the important advantage of being understood by plot holders, and this contributed to researcher-participant interactions.

Subsequent to defining the different farming styles, an analysis of variance (Hatcher *et al*, 2000) was performed using the SAS version 8 statistical package (SAS, 1999), to identify to what extent farming styles identified at Dzindi differed from each other statistically in terms of a selection of social, economic and farm enterprise variables.

Quantitative data were collected by means of a census conducted in August and September 2003 covering the demographic characteristics of plot holder households and their farming and other economic activities during the period 1 July 2002 to 30 June 2003. Eckert and Williams (1995), Makhura *et al* (1998) and Van Averbeke *et al* (1998) were the sources used during variable selection. Ninety-six of the 102 plot holders were interviewed. The unit of analysis for farm-related variables was the individual plot and for demographic and income-related variables the plot holder household.

In the economic analysis of the farm enterprises, total variable costs were defined as the sum of all variable farm inputs that were used during the year under consideration (Seitz *et al,* 2002:81-82). Gross farm income was defined as the income obtained from farming before deduction of variable costs (Penson *et al,* 2002:49). To estimate gross farm income the amounts of produce for the different crops provided by farmers during the survey were converted to their monetary values using the farm gate prices obtained by each farmer individually (Baber, 1996:187). Gross farm income was obtained by multiplying the amounts of produce allocated to home consumption, sales and gifts by the prices the individual farmers charged when they sold the different crops. Gross margins were determined by deducting total variable costs from the gross farm (plot) income (Murphy and Sprey, 1983:121).

The qualitative part of the study was concerned with obtaining insights into how plot holders perceived and explained their particular way of farming, and made use of grounded theory (Charmaz, 2000:509 and Babbi and Mouton, 2001:498) in the collection, analysis and interpretation of the data. Purposive sampling (Strydom, 2005:202) was employed to select typical representatives of each of the farming styles. A checklist covering farm enterprise objectives, ownership and access to farm assets, choice of crops, plot use intensity, specialization and diversification and key constraints, was used to guide the interviews. Selective coding (Charmaz, 2000:516 and Babbi and Mouton, 2001:500-501) was used to analyse the transcripts.

The study was conducted at Dzindi, a smallholder surface irrigation scheme of 135.6 ha that was established in 1954. Dzindi is situated in the Limpopo Province of South Africa about 6 km southwest of Thohoyandou, in the Thulamela Local Municipality of the Vhembe District Municipality. Agro-ecological conditions at Dzindi are substantially homogeneous, and the farms (plots) are identical in size. For this reason the study primarily concentrated on technical, social and economic factors.

4.   Results

4.1   Identification and definition of farming styles at Dzindi

The scatter diagram that relates gross margins and total variable costs of the 99 plots covered by the survey is presented in Figure 1.
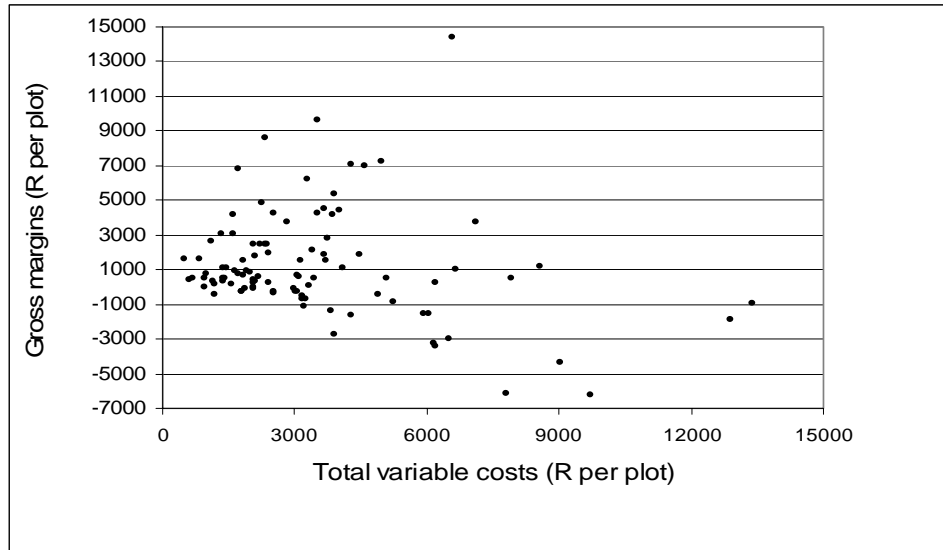

Figure 1: Relationship between total variable costs and gross margins obtained during the 2002/2003 season on 99 of 105 farm plots at Dzindi

The data points in Figure 1 were subdivided visually into three fields or clusters as shown in Figure 2.
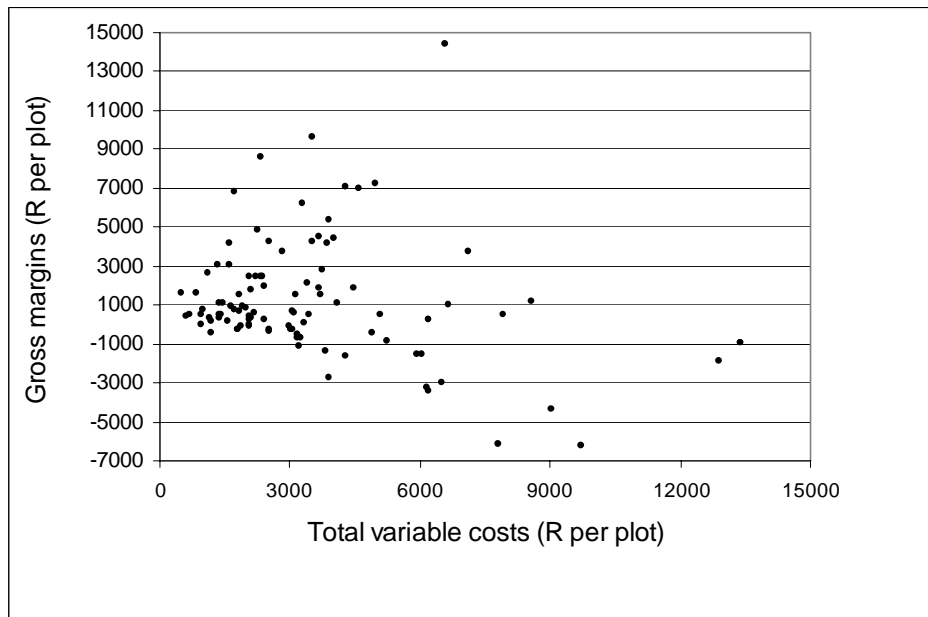

Figure 2: Preliminary clusters of plots at Dzindi

The first cluster stretched from left-of-centre to bottom-right of the diagram, and consisted of plots where the response in gross margin to increases in total variable costs tended to be negative. The second cluster occupied the centre-left of the diagram and consisted of plots where both variable costs and gross margins were low, generally less than R3,000.00. The third cluster stretched from left-centre to top-centre of the diagram and contained plots where the gross margin response to increases in total variable costs tended to be highly positive. Screening the three clusters of plots in function of farm-related variables resulted in the selection of four variables (Table 1) that appeared to explain the position of the three clusters on the scatter diagram (Figure 2). Using these four variables a key was developed to categorise the clusters of plots.

Table 1:   Selected farm-related variables characterizing the three clusters of plots identified at Dzindi (2002/03)

Characteristic	Cluster 1 (n=16)	Cluster 2 (n=44)	Cluster 3 (n=18)
Total variable costs	High	Low	Low to medium
Gross farm income	Low to medium	Low	Medium to high
Type of labour	Full-time farm worker	Family labour and occasionally temporary hired help	Family labour and occasionally temporary hired help
Use of produce	Food for home consumption and sales	Mainly as food for home consumption	Mainly for sales

Farming on plots in cluster 1 was characterized by high total variable costs and relatively low gross farm incomes. Hiring of at least one full-time farm-worker was the main factor explaining the high total variable costs. Consequently the first farming style was called *vhalimi vhatholi* or 'employers' and was defined as farmers who employed at least one full-time farm worker.

Production on plots in cluster 2 was primarily aimed at home consumption, and relatively little of what was produced was sold. This farming style was called *vhalimi vha u difusha* or 'food farmers' and was defined as farmers who realised at least 50% of their gross farm income in the form of food for home consumption, in line with the definition of subsistence farmer used by Wharton as cited by Makhura *et al* (1998).

Market-oriented production characterized plots in cluster 3. Even more typical were the relatively high returns on investment in total variable costs of production farmers holding these plots achieved. Accordingly, this third

farming style was given the name of *vhalimi vhabinduli* or profit makers and was defined as farmers who achieved a ratio of gross farm income to total variable costs of at least 2.

Following the quantitative definition of the three initial farming styles for use as a categorisation key, 21 of the 99 units did not fit any of the styles. They consisted of farmers who did not employ a full-time farm worker, realised less than 50% of gross farm income in the form of food for home consumption, and achieved a ratio of gross farm income to total variable cost less than 2. No particular attributes could be identified for the purpose of characterising and possibly defining these remaining farmers. Instead they seemed to represent transitions between the farming styles that were defined. For the sake of convenience they were referred to as 'others', and they do not feature in the discussion of farming styles presented below.

A further analysis of the ratio of gross farm income to total variable cost of enterprises in the different styles showed that food farmers could be subdivided into two sub-types, called food farmer type-1, characterized by a ratio less than 2, and food farmer type-2, where this ratio was at least 2. In Figure 3 the different farming styles are presented on the same scatter diagram that was used in Figures 1 and 2.
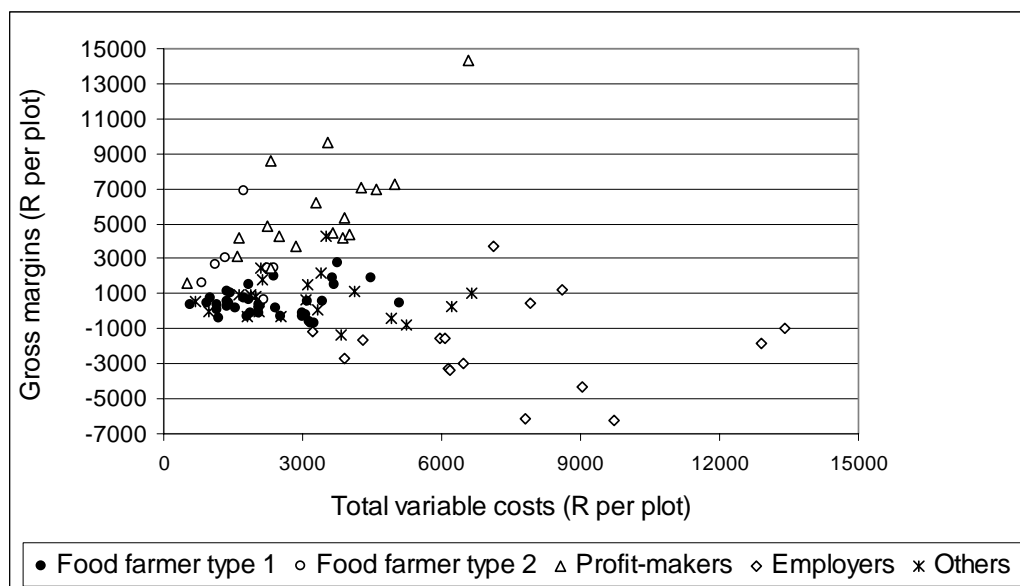

Figure 3: Farming styles identified at Dzindi

4.2   Demographic and income differentiation among farming styles at Dzindi

In Table 2 the mean values of selected demographic and income characteristics are shown for plot holder households in the different farming styles identified at Dzindi. On average, households in the different styles were comparable in size and total income. Statistically, they differed in terms of the mean age of the head of household. Households of employers had the oldest heads, and those of food farmer type 2 and profit makers the youngest.

In terms of sources of income and their relative contributions to total, households in the different styles were also fairly similar. The only really outstanding feature was the large mean contribution (59%) agriculture made to total income of households in the profit-makers style. In the other styles agriculture contributed a mean that ranged between 20 and 30% of total household income.

4.3   Farm-related differentiation among farming styles at Dzindi

Table 3 shows the mean values of selected production-related variables for the farming styles identified at Dzindi. Farming in the different styles was similar in terms of mean total area planted during the year of study, and in terms of mean area planted during summer. It differed in terms of mean area planted during winter, with farmers in the employers and profit-makers styles planting twice as much land as food farmers. Plots in the food farmer type-2 style yielded the highest mean gross income per ha from summer production, followed by profit-makers whose plots produced the highest mean gross income per ha in winter.

The high mean gross income per plot achieved by profit-makers during the winter season was associated with relatively high mean expenditure on farm inputs other than labour. In a study of the winter-vegetable commodity chain at Dzindi, Van Averbeke and Khosa (2004) found that high gross income from vegetable production was associated with choice of crop. White cabbages (*Brassica oleracea*) produced the highest gross income per unit area followed by Swiss chard (*Beta vulgaris* var. *cicla*), muxe (*Solanum retroflexum* Dun.) and Chinese cabbage (*Brassica rapa* L. ssp. *chinensis*).

Table 2:   Demographic and income characteristics of households by farming styles at Dzindi (2002/2003; n=96)

Characteristics	Farming styles*					
	Employers (n=16)	Food farmers type-1 (n=37)	Food farmers type-2 (n=7)	Profit-makers (n=16)	Others (n=20)	All (n=96)
Age of plot holder (years)	61_{ab}	58_a	51_a	52_a	63_b	58
Household size	7	6	6	6	6	6
Sources of income as a proportion to mean total household income of plot holders (%)						
▪ Salaries and wages	16.0	30.0	41.5	16.0	21.6	24.5
▪ Remittances	6.0	3.0	0.0	0.0	0.9	2.3
▪ Welfare grants	39.0	39.0	35.0	22.0	40.7	36.5
▪ Agriculture	26.0_a	23.0_a	23.3_a	59.0_b	32.0_a	31.3
▪ Other sources	13.0_b	5.0_a	0.1_a	3.0_a	5.0_{ab}	5.4
Total household income (R)	25,389.33	26,054.55	28,847.86	21,193.13	22,593.00	24,622.90
Adult equivalent income (R/month)	579.34	645.42	526.00	489.05	489.48	563.78

Notes: *The ANOVAS were done using farming styles as factors. Differences between means are differences between farming styles for a particular variable (row).
  Means followed by different sub-scripted letters differ significantly (P=0.05).
  The means of the proportional contribution of the different sources to household income cannot be used to calculate the mean Rand values of these contributions.

Table 3:   Selected production-related variables by farming styles at Dzindi (2002/2003; n=99)

Characteristics on the basis of single plots	Farming styles*					
		Food farmers (n=44)				
	Employers (n=16)	Food farmer type-1 (n=37)	Food farmer type-2 (n=7)	Profit-makers (n=18)	Others (n=21)	All (n=99)
Mean total area planted during the period July 2002 to June 2003	1.3	1.0	0.8	1.1	1.1	1.1
Mean total area planted to summer crops (ha)	0.7	0.7	0.6	0.5	0.6	0.6
Mean total area planted to winter crops (ha)	0.6$_b$	0.3$_a$	0.3$_a$	0.6$_b$	0.5$_{ba}$	0.4
Mean total gross farm income per ha for summer crops (R)	4,235.61$_a$	3,307.36$_a$	8,739.16$_c$	6,195.15$_b$	3,747.69$_a$	4,459.90
Mean total gross farm income per ha for winter crops (R)	4,357.18$_a$	2,923.74$_a$	3,377.56$_a$	10,369.94$_b$	3,214.88$_a$	4,603.10
Mean total cost of seeds used in winter (R)	253.94$_{bc}$	36.28$_a$	64.71$_{ab}$	338.39$_c$	140.62$_{ab}$	150.53
Mean total cost of pesticides used in winter (R)	189.94$_b$	87.54$_a$	89.00$_{ab}$	188.94$_b$	145.38$_{ab}$	134.90
Mean total cost of seeds per ha used in winter (R)	142.30$_a$	34.16$_a$	110.34$_a$	305.13$_b$	137.79$_a$	128.27
Mean total cost of pesticides per ha used in winter (R)	132.87$_{ab}$	87.52$_a$	119.22$_{ab}$	194.05$_b$	158.07$_{ab}$	131.43
Mean expenditure on labour as a proportion of total variable costs (%)	56.8$_b$	5.3$_a$	3.0$_a$	6.0$_a$	6.8$_a$	14.0
Mean total variable costs (R)	7,421.63$_c$	2,304.28$_a$	1,683.57$_a$	3,255.56$_b$	3,100.50$_{ab}$	3,429.29
Mean total gross farm income (R)	5,401.88$_b$	2,784.14$_a$	4,653.57$_{ab}$	8,966.11$_c$	3,861.43$_{ab}$	4,691.90
Ratio of mean total gross farm income to mean total variable costs	0.7$_a$	1.2$_b$	2.7$_{bc}$	2.9$_c$	1.3$_{ab}$	1.6
Proportion of mean total gross farm income realised as home consumption (%)	43.3$_c$	76.4$_d$	82.4$_d$	21.0$_a$	31.7$_b$	52.0
Proportion of mean total gross farm income realised as sales (%)	56.7$_b$	23.6$_a$	17.6$_a$	79.0$_d$	68.3$_c$	48.0

Notes: *The ANOVAS were done using farming styles as factors. Differences between means are differences between farming styles for a particular variable (row).
Means followed by different sub-scripted letters differ significantly (P=0.05).

4.4   Perspectives of farmers on their farming style

Table 4 summarizes selected themes that elaborate qualitative differences among the different farming styles identified at Dzindi. The two core themes emerging from the qualitative data were farmer objectives and their attitudes towards risk. These two core themes were related to several other codes, which signified socio-technical characteristics of the different styles, and which were indicative of the different strategies farmers in the different styles used to achieve their specific objectives. Built into the different strategies was a position or attitude towards risk.

Among food farmers the key objective of farming was household food security through production for home consumption. They pursued this objective using a strategy aimed at minimizing risk (of losing money).

One component of their strategy was to plant crops that feature prominently in the local diet, with maize occupying centre stage. Food farmers typically aimed at producing enough maize grain to supply their households for the entire year, and only considered selling grain after the entire maize crop had been harvested, shelled and put into bags, enabling them to identify any surplus to their household requirements. During winter, food farmers mainly planted Chinese cabbage and muxe. Relative to other vegetables grown at Dzindi, primarily white cabbages and Swiss chard, these two indigenous vegetables are low risk options for two main reasons. Firstly, their total variable cost of production excluding labour is lower than that of white cabbages and Swiss chard, because the seed is produced on-farm, and expenditure on chemicals to control pests is limited (Van Averbeke and Khosa, 2004). Secondly, marketing of Chinese cabbages and muxe is controlled by hawkers (Van Averbeke and Khosa, 2004). Daily, these hawkers visited the scheme in search of Chinese cabbage and muxe. Walking from plot to plot in search of produce, they harvested the vegetables themselves, paid the farmer on the spot, and transported the produce to their trading places using public transport (Van Averbeke and Khosa, 2004). Practically, this meant that farmers who produced these two vegetables could expect to sell at least part of their produce without having to actively seek for a market, or be concerned about transport. Part of the produce that remained on the plots found a use as food for home consumption. Another part was given away to nurture social networks. In addition there was the option of processing any surplus into vegetable powder, to sell when the fresh vegetables were no longer available (Van Averbeke and Khosa, 2004).

A second risk-avoiding component of the strategy of food farmers was the consistent use of the cheapest tractor service that was available, even when this implied delayed planting. At Dzindi this service was provided by a tractor that was owned collectively by plot holders at the Scheme and it was about 40% cheaper than the equivalent service supplied by private tractor owners (Van Averbeke and Khosa, 2004).

The third component of the food farmer strategy was to cultivate only small parts of their plots, especially during winter, thereby limiting their expenditure on total variable costs of production, and eliminating the risk of losing more money than they could afford without placing strain on their livelihoods.

Relative to type-1 food farmers, who had the most conservative approach to farming, type-2 food farmers tolerated slightly higher levels of exposure to risk. They introduced small areas of white cabbages in both summer and winter in an attempt to better recover expenditure on variable costs of production. During summer they recovered expenditure on variable costs by offering part of their maize crop for sale as green maize. At Dzindi, gross margin of maize is positively correlated with the proportion of the crop that is sold green (Van Averbeke and Perret, 2004). Typically, type-2 food farmers set aside a few beds of maize for this purpose, and assigned the rest of their maize lands to grain production to ensure that their household requirements for grain were met.

Another difference between the two types of food farmers was that type-1 food farmers were less inclined to sell surplus grain than type-2 food farmers. Instead they elected to store surplus grain at home or, in the case of good-quality white maize grain, deposited it at a commercial mill in exchange for a credit note. At the mill grain is protected against deterioration especially by weevils, which affects home-stored grain, whilst remaining instantly available for use in times of need (Van Averbeke and Perret, 2004). One type-1 food farmer had accumulated credit notes for 34 bags of grain (2,720 kg) as an insurance against future times of need.

Employers also had household food security through production for home consumption as their main objective, but in addition they attempted to recover as much as possible their expenditure on variable costs of production, which were particularly high as a result of the employment of a full-time farm worker. Their attitude to risk was similar to that of type-2 food farmers, and they employed a similar strategy, but the availability of a full-time farm worker enabled them to plant larger areas.

The objective of profit-makers was to earn cash income from farming. In pursuit of this objective they adopted a strategy characterized by relatively high levels of risk. They avoided growing the two indigenous vegetables produced by farmers in the other styles. Instead they produced mainly white cabbages during both summer and winter. Of all the crops grown at Dzindi, white cabbages provided the highest gross income and gross margin per unit area (Van Averbeke and Khosa, 2004), but they are difficult to grow in this sub-tropical environment. White cabbages are bulky and the main marketing channel consists of hawkers in possession of small or medium-sized trucks, who are fewer in number than the hawkers who purchase and retail Chinese cabbage and muxe. To ensure a market for their white cabbages, profit makers engaged in actively marketing their produce. This process commenced well before the crop was ready for harvest. Farmers contacted potential clients using their personal cell phones, and negotiated the details of the transaction. At harvest the client proceeded to the plot and selected the cabbages that met his or her quality standards. All produce that did not make the grade was left behind. Consequently, relative to the production of the two indigenous vegetables production of white cabbages exposed farmers to a higher level of risk because of higher variable cost of production, higher degrees of market uncertainty and more demanding quality concerns.

To cope with higher levels of risk, profit makers elected to use superior services and goods, such as private tractor services, which are expensive but available when wanted, high quality commercial seed, including hybrid varieties, and chemicals aimed specifically at the control of particular pests affecting white cabbages at the scheme. When growing maize, profit makers were mainly interested in selling the crop as green cobs, for which they used the same group of hawkers who were responsible for the trading of Chinese cabbage and muxe. As with white cabbages stringent quality criteria applied (Van Averbeke and Perret, 2004) and all cobs that did not meet the standard were left in the field. Typically, profit makers made their entire maize crop available for harvest as green cobs, and kept only the cobs that were not harvested for grain.

The important constraints identified by farmers in the different farming styles were closely linked to their objectives and strategies. All were concerned about a lack of water, due to the design of the Scheme and deterioration of the conveyance system (Letsoalo and Van Averbeke, 2004). Profit-makers were primarily concerned about market availability, because this directly affected the degree of success of their enterprises. Their other concern was the small size of their plot, which limited the scale of their enterprises. This concern is somewhat surprising, because on average profit makers used only 50% of their plot in summer and 60% in winter (Table 3). However, several profit makers

have sought permission from the scheme leadership to cultivate parcels of land adjacent to their plots that do not form part of the scheduled irrigation area, indicating that they do indeed experience plot size to be a limitation. Farmers in the other styles, i.e. food farmers and employers, were primarily concerned about the high cost of farm inputs.

Table 4: Qualitative differences among farming styles at Dzindi

Themes	Farming styles			
	Food farmer type-1 (n=37)	Food farmer type-2 (n=7)	Profit-makers (n=18)	Employers (n=16)
Farmer objectives and attitudes towards risk				
Farmer objective	Supply household with enough food.	Supply household with enough food and recover cost.	Generate cash income.	Supply household with food and recover costs.
Attitude towards risk	Avoid risk.	Accept low risk levels.	Accept high-risk levels.	Accept low risk levels.
Farmer strategy				
Type of tractor service	Collectively owned tractor because it is cheap.	Collectively owned tractor during winter; occasionally private tractor services during summer, when the waiting list threatens to delay date of planting.	Use private tractors or own tractor to plant all crops at the optimum time.	Collectively owned tractor, occasionally private tractor services when waiting list is too long.
Choice of crops	In summer maize and pumpkins. In winter muxe and Chinese cabbage.	In summer maize and white cabbages. In winter small amounts of a wide range of different vegetables.	In summer green maize and white cabbages. In winter white cabbages and Swiss chard.	In summer mainly maize. In winter mainly muxe and Chinese cabbage and some white cabbages and Swiss chard.
Planting date	Late in both seasons.	In summer on time. In winter late.	On time in both seasons.	Usually late in both seasons.
Plot use intensity	In summer ½ of the plot. In winter ¼ of the plot.	In summer ½ of the plot. In winter ¼ of the plot.	In summer ½ of the plot. In winter ½ of the plot.	In summer ½ of the plot. In winter ½ of the plot.
Approach to marketing	Passive.	Mainly passive.	Active.	Mainly passive.
Key constraints				
Key concerns	High cost of inputs. Too little water.	High cost of inputs. Too little water	Lack of market. Small plot size. Too little water.	High cost of inputs. Too little water

5.   Discussion and conclusions

The study revealed three distinct farming styles among smallholders at Dzindi. Farmers in each of these farming styles had particular objectives and associated strategies. The different strategies represented different degrees of exposure to risk.

Two of the three main farming styles that were identified corresponded more or less with the two extremes on the linear smallholder development trajectory model. Food farmers, especially type-1 food farmers, matched the image of subsistence farmers and profit makers corresponded with the image of commercial farmers, albeit small in scale. However, the perspectives of farmers in the different styles failed to reveal evidence that food farmers aspired to become profit makers. Instead, farmers in each of the farming styles were guided by their own particular objectives, and they employed different strategies to pursue these objectives. From their perspective, success or lack there of was determined by the extent to which they were able to achieve their specific objectives, and was not necessarily dependent on total production or monetary income. In other words, in each style farmers applied a different set of criteria to assess their degree of success. From their perspective differences between the profit maker farming style and the food farmer style did not represent a difference in the degree of success in smallholder farming.

The diversity in farming styles identified at Dzindi has implications for the impact of the current policy that is aimed at assisting commercialisation of smallholders, especially on irrigation schemes. As pointed out by Niewoudt and Vink (1989:257) diversity makes a uniform smallholder response to empowerment initiatives unlikely. In the case of Dzindi, farmers in the profit maker style are expected to keenly assess new opportunities. Food farmers type-2 and employers, who correspond to an extent with the concept of 'emerging farmers', are expected to be more conservative in their stance, and food farmers type-1 are unlikely to modify their style, because their current strategy serves their main purpose of securing adequate food for their families. Therefore, the assumption that empowerment will lead to the progression of subsistence farmers to emerging or commercial farmers is not expected to occur over the short to medium term. This change is more likely to arise as a result of structural changes in the livelihood orientation of individual farming households.

In this study, the relationship between farming style and the livelihoods of farmers received little attention, but there were indications that particular styles were strategically and structurally congruent with particular types of

livelihoods. The implication of congruence between farming styles and livelihoods is that changes in farming style are likely to occur in both directions of the linear smallholder development trajectory from subsistence to commercial farmer, even in an environment characterized by 'empowerment'. For example change from commercial to subsistence farming may occur as a result of alternative sources of income becoming available, or particular sources of expenditure falling away. During the fieldwork one of the food farmers type-1 indicated that as soon as his daughter had completed her tertiary education and started earning an income, he would hire a full-time worker to help farming his plot, because he was getting too old to handle the farm on his own. This meant that he intended to change his style from food farmer to employer. In another instance a type-1 food farm was converted to a profit maker farm when the son of a female plot holder decided to farm for a living after trying unsuccessfully for several years to earn a living off-farm. Within a matter of two years, the youngster was recognised by other profit makers as a highly successful cabbage producer.

In these two examples of change in farming style at Dzindi, transformation was related to the life cycle and livelihood structure of the household concerned, and was not a response to change in the external environment in which farming occurred. Both examples provided evidence that farming styles of smallholders in South Africa need to be studied and understood within a livelihood context.

Acknowledgements and disclaimer

Loskop Dam Aventura, which was a precursor to this article, are gratefully acknowledged. The authors also acknowledge the dedicated participation of the farmers at Dzindi, whose patience has been tested by the research process leading up to this article.

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