

## SMALLHOLDER FARMERS' PERCEPTIONS OF FACTORS THAT CONSTRAIN THE COMPETITIVENESS OF A FORMAL ORGANIC CROP SUPPLY CHAIN IN KWAZULU-NATAL, SOUTH AFRICA

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### Abstract

The 48 organic-certified members of the Ezemvelo Farmers' Organisation in KwaZulu-Natal were surveyed during October-November 2004 to assess what factors they perceive constrain the competitiveness of a formal supply chain that markets their *amadumbe*, potatoes and sweet potatoes. They identified uncertain climate, tractor not available when needed, delays in payments for crops sent to the pack-house, lack of cash and credit to finance inputs, and more work than the family can handle as the current top five constraints. Principal Component Analysis further identified three valid institutional dimensions of perceived constraints and two valid farm-level dimensions. Potential solutions to better manage these constraints are discussed, including the need for the farmers to renegotiate the terms of their incomplete business contract with the pack-house agent.

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### 1 Introduction

Policymakers in the province of KwaZulu-Natal (KZN), South Africa (SA) face considerable economic development challenges. In 2000 for example, KZN had the third highest provincial rate of unemployment (39 per cent) in SA (KZN Department of Economic Development and Tourism, 2000), and 54 per cent of its mainly rural population earned less than the international poverty threshold of US\$1 per person per day (World Bank, 2000)<sup>2</sup>. Promoting the agricultural growth of smallholder farmers like those living in rural KZN can reduce poverty by creating employment and raising household incomes (Delgado, 1999). This is likely to require that smallholder farmers must increasingly vertically integrate into existing and new supply chains for commercial cash or value-added products rather than staple commodities (Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), 2002). Given a marked increase in consumer demand for organically (chemical-

free) produced foods in SA since 1999 (Business Times, 2004), there may be opportunities for smallholder farmers with limited resources who already use organic farming methods to earn more income by producing crops for these value-added niche markets.

Research on the key constraints faced by smallholder farmers when they access these markets will help policymakers and the private sector in SA to identify how to build more sustainable links between smallholders and current and new organic crop supply chains. It will also help to build trust, cooperation and commitment amongst the players in these chains, as they must learn how to manage the constraints for mutual benefit (Hardman *et al.*, 2002; Boehlje *et al.*, 1999; O'Keefe 1998; and Doz, 1996). This paper, therefore, aims to identify the main factors that the 48 organic-certified members of the smallholder Ezemvelo Farmers' Organisation (EFO) perceive constrain organic crop production and marketing in a formal supply chain that markets their crops in rural KZN. The research focuses on the EFO

because in 2001 they were the first smallholder organisation to gain organic certification in SA. To the best of the authors' knowledge, this is the *first published study in SA* of smallholder farmers' perceptions of factors that limit the competitiveness of a formal organic crop supply chain.

The EFO farmers grow *amadumbe* (a traditional vegetable tuber), potatoes, and sweet potatoes for a formal supply chain that links them to one pack-house agent who sells the crops on their behalf to a major nationwide supermarket retail group. They also market these crops via informal supply chains to neighbours, hawkers (local traders) and a market at Isipingo 40 kilometres away. The EFO farmers currently earn price premiums of 27 per cent for *amadumbe*, 17 per cent for potatoes, and 46 per cent for sweet potatoes in the formal supply chain compared to the informal supply chains. The retailer markets these crops under a generic organic brand that does not specify that the EFO farmers grew the crops. According to the supermarket's representatives (who prefer to remain anonymous), KZN markets for these crops are growing at over 15 per cent per annum. To gain organic certification the land on which the EFO farmers grow organic crops must be free of prohibited substances, such as commercial fertilizers; the farmers and pack-house agent keep detailed records of the methods and materials used in the growing or processing of these crops; and all methods and materials are inspected annually (Modi, 2004). These farmers are described as smallholders because their average income from sales of organic crops is about R988 per annum (under R3 per day).

This paper also compares trends in the farmer's and middleman's shares of the consumer's rand and accounting net returns for the formal and informal organic crop supply chains since 2001. By tracking the incidence of any changes in relative net returns (Tomek & Robinson, 2003), these data will help to explain why the EFO farmers use both types of supply chains despite facing barriers when linking with the formal supply chain. Section 2 reviews literature on the potential types of constraints that the EFO members could face, and describes the EFO and its current contractual arrangements with

the pack-house agent. Section 3 discusses the concept of the farmer's share (FS), and how it is related to the marketing margin. Section 4 outlines the research methodology used to evaluate the EFO farmers' perceptions of the key constraints, and to estimate the players' shares and accounting net returns. Section 5 describes the characteristics of the 48 organic-certified EFO farmers, and presents empirical results. A concluding section discusses some management and policy implications of the results.

## 2

### **Potential constraints on the competitiveness of the study formal organic crop supply chain in KwaZulu-Natal**

Hardaker *et al.* (1997) define uncertainty as imperfect knowledge, and risk as uncertain consequences, particularly exposure to unfavourable consequences. This definition of risk is used in this paper, and implies that risk leads to potential variability in the returns earned by EFO farmers. If most individuals are risk-averse (Hardaker *et al.*, 1997), they would be prepared to accept lower expected returns for lower risk (the extent of the trade-off would obviously depend on how risk-averse each person is). This explains why, for example, operators might diversify their businesses to try and reduce potential income variability, or keep cash reserves. Identifying the constraints that EFO farmers perceive limit the competitiveness of the formal organic crop supply chain could help the players and policymakers to better understand where to focus resources to manage these constraints for mutual benefit.

The EFO members are likely to face several sources of business risk (risk inherent in the firm, independent of the way in which it is financed (Gabriel & Baker, 1980)), such as changes in weather, input and output price variability, input availability and economic policy changes (Sonka & Patrick, 1984). Guzman and Santos (2001) show that socioeconomic and institutional factors in an entrepreneur's external environment directly affect enterprise success

and economic development. Socioeconomic factors include access to infrastructure services such as potable water, electricity, serviceable roads, telecommunications, and protection from crime. Institutional constraints can range from the enforcement of property rights to skills training and legislation governing business operations.

Mintzberg (1989) suggests that barriers to small business survival and growth are likely to be faced in management, marketing, operations and finance. Past research also shows that typical barriers faced by small businesses and smallholder farmers include limited management skills, uncertainty about consumers' changing tastes, lack of own transport, lack of access to markets, lack of bargaining power, and a lack of resources like capital, skilled labour, crop storage facilities and market information (see for example, National Agricultural Marketing Council, 1999; Bhide, 2000; Matungul *et al.*, 2001; DGTZ, 2002; Makhura & Mokoena, 2003). Lack of access to transport, telecommunications and market information increases the transaction costs incurred by sellers to locate buyers and negotiate sales in the economic exchange process (North, 1990).

A comprehensive review by Nieuwenhuizen & Kroon (2003) of 98 articles on factors responsible for the success of small and medium-sized businesses around the world, identified business knowledge, market orientation, financial knowledge and management, and creativity and innovation, as key firm-level factors affecting successful business performance. Lack of investment, or start-up, capital and difficulty in accessing operating capital have been identified by owners of small, medium and micro-enterprises in SA as a major constraint to their business survival and growth. Inadequate enforcement of property rights in many developing countries results in a lack of collateral necessary to access investment capital, and creates a lack of incentive to make fixed improvements to land, which compounds the problem of low collateral. Difficulties in accessing investment capital may also arise if small business owners lack understanding of loan application procedures or if private

lending institutions perceive that the costs of administering relatively small loans are correspondingly high (Bannock, 2002).

Delgado (1999) identified four keys to increased smallholder participation in value-added supply chains in sub-Saharan Africa: Access to assets; access to information; access to services; and access to remunerative markets. Based on a wide-ranging literature review for sub-Saharan Africa and Asia, Dorwood *et al.* (2004) suggested it was necessary to have appropriate and high-yielding technology; local markets that provide stable prices and reasonable returns on investment in such technology; secure access to land; and infrastructure to support input, output and financial markets, for rapid increases in smallholder food production. The Global Forum on Agricultural Research (GFAR) (2005) concluded from situation research in Africa, Asia-Pacific, Latin America, the Caribbean, and West Asia that there is potential for high-value products (i.e. those that return a higher gross margin per unit of available resources than other products within a given location and context) like organic crops to increase incomes of smallholder farmers in every major region of the world and that the main constraints are similar, namely: inappropriate technology; credit constraints; production and marketing risks; and the costs of buyers dealing with many small farmers. However, the relative importance of these constraints is likely to vary from region to region, depending upon the agro-ecological conditions, local institutions and market conditions (GFAR, 2005: 3).

The above literature review suggests that the analysis of potential constraints on the competitiveness of the formal organic crop supply chain accessed by EFO farmers in KZN must consider appropriate agro-ecological, socioeconomic, institutional and farm-level (business) barriers. The process used to select these factors is described in more detail in section 4.1. The next section describes the EFO and outlines its current contractual arrangements with the pack-house agent to provide more context as to why the factors identified in section 4.1 were chosen.

## 2.1 Description of the EFO and current contractual arrangements between the EFO and the pack-house agent

The EFO is situated in the Umbumbulu district, a coastal hinterland region of KZN about 40 kilometres from the coastal city of Durban. In 2001, the pack-house agent assisted the EFO to secure organic certification, tractor services, and fencing to protect their crops from livestock. The pack-house agent now facilitates access to the retailer by 48 organic-certified members of EFO. Their crops are transported to the pack-house at subsidised rates by the KZN Department of Agriculture and Environmental Affairs. The EFO farmers also use both formal and informal supply chains as price premiums for organic *amadumbe*, potatoes and sweet potatoes are earned in the formal market. These crops are marketed by the supermarket chain under a generic organic brand in packaging that has codes to trace the products to the EFO farmers and the pack-house, but does not specify that the EFO farmers grew the crops. According to the supermarket's representatives (who prefer to remain anonymous), KZN markets for organic crops are growing rapidly at over 15 per cent per annum, and all product deliveries from the EFO farmers that have met the pack-house/supermarket's quality standards have to date been sold.

The EFO farmers do not have a written contract to formalise their business relationship with the pack-house agent. The purpose of a contract is to facilitate trade between the contractual parties, since they have made relationship-specific investments (Grossman & Hart, 1986). The lack of a written contract may negatively affect the long-term working relationship between the EFO farmers and the agent. At present, they have only a verbal sales agreement with the pack-house that has existed since the agent helped the farmers to access specific assets like organic certification, tractor services and fencing in 2001. When the pack-house is ready to buy the produce, the agent informs the EFO executive who, in turn, send the message to other members. This process is sometimes not timely, due to poor road and communication infrastructure

in the Umbumbulu district. As a result, the farmers may not know when the pack-house will make its first call, but are informed of the quantity required and the length of the call. This obviously makes the scheduling of crop collection more difficult for both the EFO farmers and the agent.

The verbal sales agreement also does not allow for a renegotiation of trading terms during the crop season. This means that the EFO farmers cannot benefit from positive changes in the market prices of their organic crops. In many instances, crop prices agreed with the pack-house at the start of the season do not link with the time of call or quality of produce delivered thereafter, thus preventing the offer of additional price premiums for timely deliveries and better quality produce. Furthermore, the verbal agreement does not state when title, value and risks associated with crop ownership pass to the buyer. Therefore, produce delivered and accepted into the pack-house remains *de facto* the property of the EFO farmers, meaning that the pack-house agent does not share business risk with the farmers (Gadzikwa *et al.*, 2005).

The crops are graded at farm-level by a member of the EFO executive before delivery to the pack-house, yet this member's terms of service are not explicit about grading procedures, remuneration for such services, and when grading should be done. If some produce is rejected, the verbal agreement does not specify handling procedures, and one fundamental weakness of the agreement is that the pooling of the farmers' produce before grading makes it difficult to trace the crops of specific farmers. Payment is based on the proportion of the quantities delivered by each farmer before grading, resulting in some farmers who produce poor quality organic crops "free riding" as they benefit from revenue earned by higher quality crops delivered by other EFO farmers. The pack-house agent re-grades the produce and asks the farmers to collect rejected crops several days after the sale has passed, often when crops are no longer saleable. Sometimes rejected crops are sold by the agent at a relatively low price that the farmers accept rather than incurring costs to collect these crops.

The verbal sales agreement also lacks penalties for breaching the contractual arrangements and clear guidelines to settle sales disagreements, thus providing an environment for some members to act opportunistically. The overall effect of having such a "gentleman's agreement" has been delays in the collection of ready-to-harvest crops from the EFO farmers, delays in payment for produce sent to the pack-house, and the delivery of lower quality crops by some members due to a lack of traceability of individual consignments. This implies that current contractual terms between the EFO farmers and the pack-house agent are incomplete, and there is scope to improve the working relationship by revising the terms of trade (Hart & Moore, 1988). Possible links between these incomplete contract terms and the EFO farmers' perceived constraints on the competitiveness of the formal supply chain are evaluated in sections 5.2 and 5.3 of the paper.

### 3

#### Overview of the concept of the farmer's share (FS)

The FS is the portion of the retail price paid by consumers per unit of a given food commodity that farmers receive, expressed as a percentage of the retail price (Kohls & Uhl, 1998). The balance of the retail price is spent on marketing services and thus represents the marketing margin (MM) (Tomek & Robinson, 2003). The MM needs to cover the costs of transferring the produce from one stage to the next, and provide a reasonable return to the middlemen that perform the marketing services (transport, storage, wholesale trade and retail trade (Brorsen *et al.*, 1985). The middleman's share is thus estimated by expressing the MM as a percentage of the retail price. If the supply of marketing services is positively sloped, the price of marketing services increases as the demand for such services increases, so that the MM will be higher the larger the quantity of a commodity produced and marketed. Conversely, assuming economies of scale in providing marketing services, their supply will be negatively-sloped, implying that lower margins are expected with a larger quantity. Margins may also change in

response to changes in the marginal cost of marketing the product, via changes in derived demand and supply. These changes in the unit marketing costs may result from technological improvements in the provision of such services (Tomek & Robinson, 2003).

Oligopsony (few buyers) power may result in larger MMs (Rogers & Sexton, 1994) as increasing concentration can lead to noncompetitive allocations of resources that result in higher prices for the final product than would occur under more competitive market conditions. There is no guarantee that these higher prices of the final product will be symmetrically transmitted to farmers (Tomek & Robinson, 2003). Therefore, farmers may receive lower than competitive farm prices (lower FS), and consumers may pay higher than competitive retail prices. Changes in MMs over short periods of time are largely caused by changes in the supplies of raw farm products or consumer demand, while longer-term changes mainly result from changes in the cost of labor and other inputs used by marketing agencies. Long-term trends in MMs tend to parallel movements in the general price level, since MMs reflect the trends in the costs of goods and services provided by non-farm industries. Thus, increasing average MMs can be a result of increasing costs, increasing profits or a shift to a more costly food distribution channel (Hahn, 2004).

Price risk can also influence the size of MMs. Risk is like a cost to the risk-averse middleman like a processor, who may buy a farm commodity at a known current price but be uncertain of the price at which the processed product may be sold (Brorsen *et al.*, 1985). Finally, MMs vary among products because of the differences in the services provided and the degree of perishability – perishable products have higher margins due to storage costs incurred before they are sold (Tomek & Robinson, 2003). Removing middlemen from the commodity supply chain will not necessarily reduce the MM since the MM is a function of the costs of marketing (Kohls & Uhl, 1998). For example, if the pack-house agent is removed, the EFO farmers or other middlemen will have to perform transport, storage, packaging and distribution activities.



There is no guarantee that they or other middlemen can perform these activities better.

A large MM or a falling FS do not necessarily indicate the level of farm prices or farm income (Kohls & Uhl, 1998). If more organic crops are consumed, the total marketing costs for these crops may increase and the FS may fall. This, however, could increase net rand returns to producers as more product volume is traded. This paper estimates the FS of the consumer's rand for the EFO farmers, and the pack-house agent's and retailer's shares in the formal supply chain, and how this distribution has changed during 2001-2004, for all three organic crops. It also compares these trends with the FS of the EFO farmers and the hawker's share in the informal organic crop supply chains.

## 4

### Research methodology and data sources

This section first outlines the study data sources, and how the EFO members' perceptions of constraints on organic crop supply chain competitiveness were elicited. It then explains how Principal Component Analysis (Manly, 2005) was used to identify further "dimensions" in these perceptions, and how the players' shares of the consumer's organic crop rand were estimated. Given the literature review in section 2, the plausible research hypothesis underlying the analysis is:

*H<sub>1</sub>: Identifying and communicating the key constraints that limit the competitiveness of the formal organic crop supply chain will improve the players' understanding of each other's business, and of where resources must be committed in order to jointly solve problems. These constraints are likely to include factors like drought, variable prices for organic crops, changes in the costs and availability of inputs (particularly manure and labour), lack of access to capital and other resources such as land and crop storage facilities, and lack of production and marketing information.*

### 4.1 Data sources and census survey

During October-November 2004 a census survey was used to personally interview the 48 members of the EFO that were organic-certified. They were each asked to give their perceptions of the main constraints that limit the competitiveness of the formal organic crop supply chain by ranking the 20 potential agro-ecological, socioeconomic, institutional and farm-level constraints listed in Appendix 1 on Likert-type scales from 1 (no problem) to 3 (severe problem). The authors hypothesised that these constraints were appropriate to the EFO situation based on the local and international literature cited in section 2, interviews with experts in smallholder crop production and marketing methods in the Umbumbulu district (Modi, 2004; Pringle, 2004), the authors' knowledge of the current drivers of change in SA agriculture, and the authors' observations made during site visits in February 2004 to meet EFO members and the pack-house agent.

The 20 potential constraints include uncertain climate, socioeconomic and farm-level factors to reflect lack of access to inputs (e.g. labour, cash, credit, storage, transport, telephones, manure, and land), and institutional factors such as lack of tractor availability, lack of marketing information, and a lack of bargaining power. The EFO growers were also asked to score any other constraint(s) that they wanted to add to the hypothesised list. The 48 farmers' mean scores for, and rankings of, the constraints are reported in section 5.2. The farmers were also asked to provide information on their personal and household characteristics such as age, gender, years of schooling attained, farm area, labour use, and proportion of household income from farming.

### 4.2 Principal component analysis (PCA)

The PCA technique aims to summarise the information contained in a number of correlated variables (in this case the 20 (or more) constraints) into a smaller set of uncorrelated dimensions with minimal loss of information (Manly, 2005). The decision about which of the principal components (PCs) to retain

depends on the percentage of the variation in the original variables accounted for by each PC, and whether the PC can be *meaningfully interpreted* (Koutsoyiannis, 1987). The PCs can be estimated as linear functions of the original 20 constraints as:

$$PC_i = a_{i1}X_1 + a_{i2}X_2 + \dots + a_{i20}X_{20} \quad (1)$$

where  $i = 1 \dots 20$ ;  $a_{i1} \dots a_{i20}$  = the component loadings; and  $X_1 \dots X_{20}$  = the 20 constraints listed in Appendix 1. The method of PCA assumes that interval data that are multivariate normally distributed will be used, but Kim and Mueller (1978) justify the use of ordinal data like Likert-type scales under two conditions that are met in this study. These are firstly, if the PCA is used to find general clusterings of variables for exploratory purposes (further dimensions in the perceived constraints), and, secondly, if the underlying correlations among variables are believed to be moderate – say less than 0.6 or 0.7 (see section 5.2). The PCs in this study are estimated using the covariance matrix as the Likert scores are in the same units, implying that no constraint is likely to have an undue influence on the PCs due to a much larger variance (Manly, 2005). Results of the PCA showing the main underlying “dimensions” in the scores given by the 48 fully organic-certified EFO farmers are given in section 5.2.

### 4.3 Analysis of the players' shares of the consumer's organic crop rand and accounting net returns

Farm-level prices for the three organic crops were calculated from average annual prices provided by the EFO farmers for the period 2001-2004 for both the formal and informal supply chains. Only the EFO produce that meets the retailer's organic quality standards is considered for sale to the pack-house and the rejected produce remains *de facto* property of the farmers. Therefore, the farm product physical equivalent is approximately the same as the retail quantity for the three organic crops, that is, 1 kilogram (kg) of an organic crop is transformed into approximately 1kg of the end product on a one-to-one fixed proportion

basis. Production and marketing cost data since 2001 were difficult to obtain from the farmers, but 2004 season estimates for inputs such as draught power, manure and hired labour were available and used to calculate net returns per kg. Hawkers reported selling prices for the three organic crops since 2001, but they had limited cost data. Marketing costs incurred by hawkers are mainly transport costs based on an average of two orders per week for all crops, and storage costs, which they reported for the 2004 season. The paper hence estimates hawkers' net returns using a storage cost of R3 per day, and expended hired labour costs based on the minimum wage of R4.87 per hour if one works less than 27 hours a week (South African Department of Labour, 2005). Hawkers spend about half a day digging for and cleaning the organic crops, and they do this on average twice a week.

Data on the MMs and costs of the pack-house and the retailer could not be obtained directly due to the sensitivity of this proprietary information. However, selling prices, the main pack-house costs (labour and transport) for the 2004 season, and the total crop units sold were obtained from a consulting firm (that asked to remain anonymous) that conducted a feasibility study of the pack-house in 2004. Further cost data were collected from organic crop farmers in KZN who supply similar crops to the retailer. Average seasonal crop prices since 2001 were estimated by deflating the 2004 prices using a monthly vegetable consumer price index for January 2000-January 2005 obtained from Statistics SA (2005), with the 2003-04 season as the base period. Historical retail prices were estimated using a margin between the retail price and the price paid to the pack-house of 33 per cent that the retailer reported applied across all three crops.

The players' relative shares of the consumer's organic crop rand were then estimated as follows, using data for potatoes in the 2001-2002 season to illustrate (the pack-house agent purchased organic potatoes from EFO farmers at R2.50 per kg, the weighted average pack-house selling price was R5.38 per kg, and the weighted average retail price was R8.07 per kg):

$$\begin{aligned}\text{Farmer's share (FS)} &= (R2.50 \div R8.07) \\ &\approx 31\% \quad (2)\end{aligned}$$

$$\begin{aligned}\text{Pack-house share} &= (R5.38 - R2.50) \div (R8.07) \\ &\approx 36\%, \text{ and} \quad (3)\end{aligned}$$

$$\begin{aligned}\text{Retailer share} &= (R8.07 - R5.38) \div (R8.07) \\ &\approx 33\%. \quad (4)\end{aligned}$$

Changes in these relative shares since 2001 are discussed in section 5.3.

## 5 Results

### 5.1 Characteristics of the 48 organic-certified EFO farmers

The 48 organic-certified farmers were relatively elderly, with an average age of 53 years at the time of the survey. Their average level of formal schooling was quite low at 4.9 years, and most of these farmers (80 per cent) were women. The average household size supported by the 48 fully organic-certified farmers was about 9 people. Farm area allocated to the three organic crops ranged from 0.02 hectares to 2.80 hectares, with a mean of 0.65 hectares. Average annual farm income was R988 per household, and the range from R89 to R5194 indicates that most farm areas were below the mean of 0.65 hectares. Male farmers tended to operate relatively larger areas of organic crops than female farmers (mean areas of 0.83 hectares and 0.31 hectares, respectively, were statistically significantly different at the 5 per cent level). Farm income comprised on average 33 per cent of total annual household income for these EFO members. Some of the 48 farmers have unused land that could be rented out (if permitted by the local chief) to other fully organic-certified members that want access to more land. The amount of family labour (adult equivalents) used on the relatively small areas allocated to organic crops was about four units on average. According to Modi (2004), the organic-certified EFO members farmed relatively more intensively (smaller areas with more family labour) than non-EFO members in the Umbumbulu district.

### 5.2 Farmers' scores for and rankings of the perceived constraints

The 48 organic-certified EFO farmers' mean scores and rankings of the potential constraints that limit the competitiveness of the formal organic crop value chain in KZN are shown in descending order of importance in Table 1. Where these results reflect valid perceptions, they identify key issues that all players in the formal organic crop supply chain need to communicate about, commit resources to, and jointly solve. Climatic conditions are beyond the farmers' control, and the top ranking for this constraint reflects the farmers' justifiable concerns about the effects of recent (2004) drought in the Umbumbulu district. The estimated standard error of the mean score (SE) for uncertain climate was the lowest (0.02), implying that the farmers tended to give similar scores for this constraint.

There was also relatively less deviation about the mean score in the 48 farmers' rankings for the tractor not being available when needed, delays in payments from the pack-house, and inputs not being available at affordable prices (SE = 0.05 for all these constraints). Concerns about access to tractor services are understandable as the members share one tractor and the authors noted a lack of adequate scheduling of tractor use. The delays in cash payments are caused by the pack-house agent re-grading some crops, the pool pricing system (lack of traceability), and a lack of explicit grading procedures at EFO level in the verbal contract. The perceived lack of inputs at affordable prices in part reflects an increase in the derived demand by EFO farmers for more family labour, manure and crop storage facilities relative to the supply of these inputs as the demand for organic crops has risen by 15 per cent per annum since the farmers were organic-certified in 2001. This would have increased the demand for cash (and credit in households with lower cash reserves) to finance higher input prices. These changes explain why the farmers score a lack of cash and credit to finance inputs, more work than the family can handle, and a lack of manure and storage facilities relatively highly. The authors cannot assess the validity of perceptions that these inputs are not



affordable as no data were available on trends in productivity and real farm incomes and real farm costs for these farmers since 2001.

**Table 1**

The 48 EFO farmers' rankings of the key constraints on the competitiveness of the formal organic crop supply chain, KwaZulu-Natal, 2004

Constraint	Mean	SE	Rank	Constraint	Mean	SE	Rank
Uncertain climate (e.g. drought)	2.98	0.02	1	Livestock damage crops	2.51	0.11	11
Tractor is not available when I need it	2.92	0.05	2	Lack of information about consumer preferences for our organic products	2.42	0.09	12
Delays in payment for products sent to pack-house	2.87	0.05	3	Lack of information about alternative markets	2.38	0.10	13
Inputs not available at affordable prices	2.83	0.05	4	Uncertain prices for products sold to pack-house	2.21	0.11	14
Lack of cash and credit to finance inputs	2.77	0.09	5	Lack of bargaining power over product prices at the pack-house	2.15	0.10	15
Lack of affordable transport for products	2.74	0.07	6	Cannot access more cropland	2.02	0.11	16
More work than the family can handle	2.63	0.08	7	Pack-house does not reward me fully for my own product	2.00	0.13	17
Cannot find manure to purchase	2.62	0.09	8	Uncertain prices for products sold to other markets <sup>1</sup>	1.96	0.12	18
Lack of proper storage facilities	2.56	0.09	9	Lack of information about producing organic crops	1.96	0.09	18
Lack of telephones to negotiate sales	2.54	0.09	10	Cannot find labour to hire	1.75	0.12	20

Note: Rankings are based on the 48 EFO farmers' average scores on each constraint, which ranged from 1 (minor constraint) to 3 (major constraint).

<sup>1</sup> SE = standard deviation of the mean; <sup>1</sup>Other markets refer to hawkers and the Isipingo market that is 40 kilometres from Umbumbulu.

The perceived lack of affordable transport for crops in the formal organic crop supply chain is not valid as the EFO members' crops are trucked to the pack-house at subsidised rates by the KZN Department of Agriculture and Environmental Affairs. This result rather reflects the farmers' perceptions about the costs of supplying the

informal market at Isipingo over 40 kilometres from Umbumbulu. Lack of access to landline telephones was observed by the authors and is a legitimate claim, while the fairly strong perception of livestock damage to organic crops is debatable as the pack-house agent provided fencing in 2001 to prevent livestock from grazing

on organic crop areas. The EFO chairperson, and the survey manager, did, however, report higher incidence of livestock damage to crops during recent drought as animals sought alternatives to poor quality grazing (Buthelezi, 2004; Mkhize, 2004).

The farmers' relatively high mean scores for lack of information about consumer preferences for organics crops and about alternative markets show their lack of market-orientation (they do not perform any marketing activities beyond the farm-level), and their use of a single formal organic crop market via the pack-house. Perceptions of uncertain prices for crops sold to the pack-house, and a lack of bargaining power in setting these prices, are explained by the double grading procedures, incomplete contract terms for crop handling, and the pool pricing of crops described in section 2.1. Perceptions that access to more land is limiting (the sixteenth ranked constraint) are also legitimate as it takes time to gain the local chief's permission to use more land.

There was relatively more variation in the 48 farmers' perceptions about whether the pack-house rewarded them fully for their crops ( $SE = 0.13$ ), uncertainty about prices sold in other markets ( $SE = 0.12$ ), and whether labour could be found to hire ( $SE = 0.12$ ). A perceived lack of full reward from the pack-house is understandable as farmers producing higher quality crops receive the pool price and an individual farmer's crops are not traceable (see section 2.1). Price risk in other markets is an expected source of business risk (cost) for crop producers (see section 2). Lack of information about producing organic crops has a low ranking (tie eighteenth) relative to the other constraints as the EFO farmers have received specialist extension advice in organic crop production from staff at the University of KwaZulu-Natal since 2001. Hired labour availability is the lowest ranked constraint, probably reflecting that labour can be found in the Umbumbulu district but at perceived relatively higher cost than before (Mkhize, 2004), as reflected by the fourth ranked constraint.

There was limited variation in older and younger EFO farmers', or in male and female EFO farmers', perceptions about the 20 potential

constraints. The few statistically significant correlation coefficients (at the 10 per cent level or below) between these demographic variables and the constraints showed that: older farmers were more likely to cite more work than the household could handle; younger farmers were more likely to perceive a lack of manure and lack of information about organic crops; female farmers were relatively more concerned about a lack of cash or credit to finance inputs and a lack of proper crop storage facilities; and male farmers more strongly perceived uncertainty about prices paid by the pack-house, a lack of bargaining power with the pack-house and lack of information about consumer preferences. This suggests that younger and female farmers were relatively more concerned about access to non-labour inputs, while male farmers, who tend to farm larger areas, were relatively more concerned about pricing, bargaining and information constraints.

The pack-house agent declined a formal interview for reasons of confidentiality that the researchers have respected. The agent did, however, acknowledge the need to improve crop grading procedures and traceability of each farmer's crop deliveries, communicate about crop pricing, some associated past delays in payments, the need to upgrade crop storage facilities, and that more EFO members had to become market-oriented. Interviews with staff employed by the retailer identified relatively high transport costs, the inability of farmers to meet unexpected crop demand, perishability of crops, failure by some farmers to meet relatively high organic crop quality standards, and farmer's lack of information about the marketing of organic crops as the top five constraints.

The farmers probably ranked transport costs as a less pressing constraint compared to the retailer's staff because their crop transport is subsidised by the KZN Department of Agriculture and Environmental Affairs, and they do not incur any transport costs when selling to hawkers. The retailer's staff perceptions of crop perishability as a constraint mirror the farmers' perceptions of a lack of storage facilities, implying that better crop storage facilities and product delivery scheduling could improve supply chain performance. According to Modi

(2004), the existing facilities are inadequate because they lack appropriate cold storage structures that help to maintain crop quality. The retailer's staff also cited lack of marketing information as a constraint – this implies that more cooperation and better communication of information, such as changing consumer preferences for organic crops, between the EFO farmers and the agent/retailer could reduce transaction costs in the supply chain.

The valid constraints identified by the EFO farmers, the pack-house agent and the supermarket staff give considerable support to the study research hypothesis specified in section 4 above. An understanding of these perceived constraints can help the players to make more informed decisions about where to allocate scarce human and other resources in order to try and improve the competitiveness of the KZN formal organic crop supply chain. Section 5.3 describes the results of the PCA that provide more information for this purpose by identifying *further dimensions* in the 48 EFO farmers' scores for the perceived constraints.

### 5.3 Principal component analysis of the farmers' scores for the constraints

All of the estimated correlation coefficients between the farmers' scores for the constraints, except that between the scores for uncertainty about prices received from the pack-house and not being fully rewarded by the pack-house, were less than 0.7. Following Kim & Mueller (1978), PCA was, therefore, applied for exploratory purposes to find general clusterings of these constraint scores as further dimensions. Six PCs that explained 71.4 per cent of the variance in the farmers' scores were extracted from the covariance matrix using the SPSS statistical package (Norusis, 1994) as shown in Table 2. Koutsoyiannis (1987) suggests retaining PCs that meet Kaiser's criterion (have eigenvalues of one or above), have estimated component loadings greater than 0.3, and can be meaningfully interpreted. Although the eigenvalues for five of the PCs in Table 2 are below one, the PCs are still reported as the SPSS statistical programme rounds off eigenvalues greater than 0.5 to one by default (Norusis, 1994), and the six can be

meaningfully interpreted. These PCs are also in non-rotated form as Varimax rotation did not improve their interpretation (Norusis, 1994).

The first component (PC1) explained 27.2 per cent of the variance in the farmers' scores, with all seven estimated loadings above 0.3 being positive. The relative sizes of these loadings show that EFO farmers who strongly perceived that the pack-house did not reward them fully for their crops were more uncertain about crop prices in both the formal and informal supply chains, felt strongly that they cannot find more labour to hire, and perceived that they lacked bargaining power over crop prices. According to Thompson & Strickland (1998), buyers have a stronger competitive advantage when they can exercise bargaining leverage over price, quality, service or other terms of sale. These farmers also felt strongly that they lacked access to telephones to negotiate sales and lacked information about consumer preferences for organic crops. Based on the discussion in section 5.3, this PC captures valid perceptions of a "lack of market information and lack of market power". Component PC2 explained 11.7 per cent of the variance in constraint scores, and denotes that EFO farmers who rank crop damage by livestock highly also rank lack of access to more cropland and lack of cash or credit to finance inputs highly, but perceive less uncertainty about prices for crop sales to the pack-house. This PC thus reflects tangible "crop production expansion constraints" faced by the EFO members.

Component PC3 accounted for 11 per cent of the variance in the EFO farmers' scores and captures how farmers who strongly perceive a lack of access to more cropland and information about alternative markets probably do not lack information about producing organic crops. This dimension reflects a "commitment to crop area expansion" that is in part constrained by the institutional rules for allocating land in the Umbumbulu district. The fourth component, PC4 explained 8.7 per cent of the variance in constraint scores and implies a "lack of liquidity" dimension, as a perceived lack of full reward for crops sent to the pack-house links with a perceived lack of finance for inputs.

**Table 2**

Principal component loadings estimated for the 48 EFO farmers' scores for perceived constraints on the competitiveness of the formal organic crop supply chain, KwaZulu -Natal, 2004

	<b>Component</b>					
<b>Component</b>	<b>PC1</b>	<b>PC2</b>	<b>PC3</b>	<b>PC4</b>	<b>PC5</b>	<b>PC6</b>
Variation accounted for	27.21	11.67	10.98	8.72	6.58	6.16
Eigenvalue	2.26	0.971	0.913	0.725	0.547	0.512
Livestock damage crops	0.241	<b>0.476</b>	-0.226	0.147	-0.252	-0.040
Uncertain climate (e.g. drought)	-0.009	0.000	0.057	0.006	-0.017	0.070
Uncertain prices for products sold to pack-house	<b>0.559</b>	<b>-0.389</b>	0.140	0.235	0.034	0.078
Uncertain prices for products sold to other markets <sup>1</sup>	<b>0.556</b>	0.197	0.064	-0.223	-0.059	0.254
More work than the family can handle	0.103	0.181	-0.261	0.216	-0.195	0.039
Lack of cash and credit to finance inputs	-0.117	<b>0.315</b>	0.011	<b>0.325</b>	0.180	-0.082
Lack of information about producing organic crops	0.263	0.060	<b>-0.389</b>	0.017	0.159	0.262
Lack of information about alternative markets	0.183	0.071	<b>0.338</b>	-0.058	-0.081	<b>0.383</b>
Lack of proper storage facilities	-0.267	0.133	-0.150	0.003	<b>0.491</b>	0.126
Lack of affordable transport for products	-0.083	-0.033	-0.227	-0.056	0.012	0.193
Lack of telephones to negotiate sales	<b>0.372</b>	0.123	0.022	0.147	0.065	0.054
Inputs not available at affordable prices	-0.025	0.100	-0.023	0.176	-0.040	-0.047
Tractor is not available when I need it	-0.069	0.122	-0.038	0.057	0.152	-0.088
Cannot find manure to purchase	-0.186	0.087	0.282	0.277	0.019	0.245
Cannot find labour to hire	<b>0.609</b>	0.209	-0.205	-0.150	-0.023	-0.118
Cannot access more cropland	0.156	<b>0.473</b>	<b>0.493</b>	-0.018	0.147	-0.136
Delays in payment for products sent to pack-house	-0.026	0.018	0.048	0.102	-0.006	0.103
Lack of bargaining power over product prices at pack-house	<b>0.466</b>	-0.028	0.191	-0.271	0.071	-0.164
Lack of information about consumer preferences for our organic products	<b>0.359</b>	-0.004	-0.145	-0.194	0.258	-0.010
Pack-house does not reward me fully for my own product	<b>0.676</b>	-0.279	0.005	<b>0.403</b>	0.110	-0.123

There is some validity to this dimension, given the crop pool price arrangements, and the likely increase in input prices of manure and labour described in section 5.3. The PC5 displayed the fifth largest amount of variation (6.6 per cent) in the farmers' scores, and identifies a valid "lack of proper crop storage facilities". Finally, PC6 is a "lack of information about alternative markets" constraint that the authors and retailer staff can verify, and accounted for 6.2 per cent of the variation in the EFO farmers' scores for the constraints.

The 48 EFO farmers have access to one agent in the formal organic crop supply chain and this could reduce their bargaining power. Becoming more market-oriented and acquiring knowledge of prices and consumer demand in alternative markets could improve their ability to contest the formal organic crop supply chain (i.e. have more influence on prices as they could exit and sell to other markets) (Willig, 1987)) and so improve price premiums and net returns. These alternative markets need to be formal, where the organic standards are observed in order for the players to understand the price premiums (if any) from selling organic crops. Some markets used by the EFO farmers, for example at Isipingo, do not differentiate between conventional products and organic products, and thus no price premiums can be captured.

#### 5.4 Trends in the farmer's and middleman's shares since 2001

The real (inflation-adjusted) FS in the formal supply chain increased for the 48 EFO farmers during 2001-2004 for all three organic crops - from 37 to 45 per cent for *amadumbe*, 33 to 45 per cent for sweet potatoes, and 31 to 35 per cent for potatoes, respectively (see Appendix

2). The pack-house share fell and the retailer share remained at 33 per cent over this period. In 2003-04 the pack-house share for *amadumbe* and sweet potatoes fell to 22 per cent, while the FS rose to 45 per cent. While these data are not sufficient to establish a long-term trend, they probably reflect continued efforts by the EFO farmers to bargain for better prices. Although the pack-house share declines for all three crops, the drop is relatively less for potatoes.

For the informal supply chain (see Appendix 3), the FS fell from between 46 per cent and 54 per cent to between 39 per cent and 44 per cent since 2001-02, while the hawker's share rose to between 56 per cent (*amadumbe* and potatoes) and 61 per cent (sweet potatoes). The FS seems to be larger, but declining, in the informal supply chain (except for *amadumbe* and sweet potatoes in 2003-04) compared to the formal supply chain. As discussed in section 3, little can be concluded about these relative shares unless data on marketing costs are available. Increases in MMs due to increases in marketing costs may not mean increases in profits made by the players in the supply chain. Information on some costs is, therefore, introduced in Appendix 4 to add more meaning to the reported relative shares by estimating real accounting net returns (sale price per kg less accounting costs per kg) that are summarised in Table 3. These statistics are defined as accounting net returns because they understate costs by excluding the opportunity cost of capital and management time, and the value of the government transport subsidy. The reported costs could only be collected for the 2003-04 season as the EFO farmers and hawkers did not have detailed long-term records, and the pack-house agent and the retailer considered that this information was confidential.

**Table 3**

Accounting net returns (in rand) for different players in the three organic crop supply chains, KwaZulu-Natal, 2004

Supply chain player	<i>Amadumbe</i> (R per kg)	Sweet potatoes (R per kg)	Potatoes (R per kg)
Pack-house agent	1.51	1.50	2.79
Hawkers	1.71	2.07	1.71



EFO farmers selling to the pack-house agent	0.85	1.44	1.15
EFO farmers selling to hawkers	1.42	1.65	2.01

Hawkers had the highest estimated net return per kg for *amadumbe* (R1.71) and sweet potatoes (R2.07), while the pack-house had the highest estimated net return per kg for potatoes (R2.79). The EFO farmers had comparatively lower net returns per kg across all three crops in the formal organic crop supply chain, and for *amadumbe* and sweet potatoes in the informal crop supply chain. Their net returns for all three crops in the informal crop supply chain were, however, higher than in the formal supply chain. This reason is that hawkers in the informal supply chain incur the harvesting, cleaning and transport costs when they collect the crops from the EFO farmers' fields. There is, however, no guarantee that the hawkers will purchase all of the crop volumes produced, thus producing sales uncertainty for the EFO members. The hawkers are also not obligated to observe the formal supply chain quality standards in the handling and marketing of the crops.

The EFO members probably still market via the pack-house, despite lower relative estimated accounting net returns, due to the "hidden (non-quantified) benefits" provided by the pack-house agent, namely past help in securing organic certification, tractor services and fencing, and currently facilitating access to the retailer, and, by the KZN Department of Agriculture and Environmental Affairs, transport subsidy. The agent has reduced transaction costs for the EFO farmers in locating a buyer for their organic crops, but the farmers still perceive price uncertainty for crops sold to the pack-house – despite agreeing prices at the start of the season – probably due to their crops being pooled before delivery.

## 6

### Discussion and conclusions

The top 10 valid constraints on the competitiveness of formal organic crop supply chain in KZN identified by the 48 fully organic-certified EFO farmers included: uncertain climate; the tractor

not being available when needed; delays in payments made by the pack-house; a lack of cash and credit to finance inputs; more work than the family can handle; a lack of manure, crop storage facilities, and telephones to negotiate sales; and a lack of information about consumer preferences for organic crops and about alternative markets. Principal Component Analysis further extracted three valid institutional dimensions of the 20 constraints hypothesized in the study – a "lack of market information and lack of market power"; "crop production expansion constraints" hindering a commitment to crop area expansion; and a "lack of information about alternative markets" – and two valid farm-level dimensions – "lack of liquidity"; and "lack of proper crop storage facilities".

Climatic conditions such as the recent (2004) drought in the Umbumbulu district are beyond the farmers' control and affect the delivery quantity and quality of the organic crops. The potential role of supplemental irrigation, water harvesting (storage) during rainy seasons, and small boreholes in helping to manage this constraint needs further research. Improving access to tractor services by better machine scheduling or using contractor services, and quicker pack-house payments for organic crop deliveries are potential solutions to the second and third ranked constraints. The latter would entail renegotiating the current incomplete contract terms in the verbal agreement between the farmers and the pack-house agent to better coordinate crop grading procedures at EFO and pack-house levels, and improve the traceability of each farmer's crop deliveries. These changes would also help to alter perceptions about a lack of full reward from or a lack of bargaining power with the pack-house agent. Some of the farmers perceive low rewards from the pack-house because of poor quality organic crops supplied by other members, implying that improving quality control and grading at the point of departure (farm-level or EFO inspection level) could help to ease this constraint.

Lack of liquidity will remain a constraint in the medium-term for those EFO farmers who want to expand their crop areas as they operate on communally-owned land and they cannot pledge land as collateral for debt finance. The concepts of interlinked contracts or liens on crops as substitutes for such collateral need further research as alternative solutions to managing this constraint. The EFO farmers may need more advice on how to improve their negotiating skills in order to improve their bargaining power with the pack-house agent, although their higher farmer's shares for the three crops since 2001 indicate that their bargaining power has increased relative to the agent. Conscious efforts to obtain more information about consumer preferences and alternative markets would make the EFO farmers more market-oriented and more knowledgeable about organic crop quality requirements. This raises the question of how to, and who will, provide this information, and whether the expected benefits from the additional information will exceed the expected search costs, particularly as most of these farmers have relatively small areas under organic crops.

The evidence of a crop production expansion constraint hindering a commitment to crop area expansion could be an opportunity for policymakers to actively work with members of the EFO to promote the development of land rental markets for those members that want to expand their areas under organic crops (see Thompson & Lyne, 1995 and Crookes & Lyne, 2001, for discussion on the process of establishing rental markets in areas like the Umbumbulu district that have communal tenure institutions). Again, the mechanics of implementing such a market in the EFO situation requires further research. This process could be assisted and justified if the EFO farmers, the pack-house agent and the retailer consider jointly investing in appropriate storage facilities for the organic crops. Weiss & Anderson (1992) argued that such reciprocal specific asset investments reduce dissatisfaction between supply chain partners.

The retailer's staff cited relatively high transport costs, EFO farmers' production inflexibility, low crop shelf-life (perishability), failure by some EFO farmers to meet quality

standards, sometimes lower profits for organic foods compared to conventional foods, and farmers' lack of information about the marketing of organic crops as key constraints. The agent also acknowledged the need to improve crop grading procedures and traceability of each farmer's crop deliveries, communicate about crop pricing, some associated past delays in payments, the need to upgrade crop storage facilities, and that more EFO members had to become market-oriented. The upgrading of storage facilities at farm-level suggested in the previous paragraph would extend crop shelf-life and improve crop quality.

The EFO farmer's share of the consumer's organic crop rand in the formal KZN crop supply chain over the period 2001-2004 increased, but the EFO farmers' accounting net returns were higher for the informal supply chain compared to the formal organic crop supply chain. There are, however, "hidden benefits" from maintaining the formal organic crop supply chain relationship – the pack-house agent has helped to secure organic certification, tractor services and fencing for the EFO members, and currently facilitates access to the retailer, while transport for crop deliveries to the pack-house is subsidized. These benefits are, however, in part offset by perceived price uncertainty for these deliveries – despite crop prices being agreed at the start of the season – due to the pooling of poor and higher quality crops before delivery.

Finally, the commitment of the EFO farmers to, and hence the competitiveness of, the formal organic crop supply chain may be improved by replacing the current (incomplete) verbal sales agreement between the EFO farmers and the agent with a formal written contract. This contract would need to be written in IsiZulu and could reduce price uncertainty and create incentives to improve crop quality (and sales revenue) by specifying regular reviews of trading terms (such as crop prices) over the crop season; crop quality control and grading standards and procedures; handling and pricing procedures for rejected produce; turnaround times for crop delivery payments to farmers; and mechanisms for tracing crop quality back to individual farmers rather than pool pricing.

While the research results are specific to the 48 organic-certified EFO farmers, they do identify some issues for local policymakers, the private sector and smallholders to address in trying to organise better access to formal supply chains that resemble experience in other rural areas around the world, namely: appropriate products; location specific agro-ecological conditions; labour and other location specific input constraints; the need for institutional innovations; lack of smallholder marketing orientation; and clearly defined and enforced contract trading terms to foster trust, cooperation and commitment and reduce transaction costs; long-term commitment by all players in the supply chain. Regarding the former, there is concern that reliance on the single pack-house agent and the government transport subsidy may jeopardise the sustainability of EFO links to the formal organic crop supply chain if these services are withdrawn, particularly for the farmers operating relatively small areas.

Limited evidence that older farmers focus more on family labour constraints, younger and female farmers are relatively more concerned about access to non-labour inputs, while male farmers, who tend to farm larger areas, are relatively more concerned about pricing, bargaining and information constraints, suggests that access may also be promoted by focusing on key constraints specific to different types of smallholders. A useful area for future research not addressed in this paper would be to assess different smallholders' attitudes towards risk, as these would likely influence their decisions about crop mixes and which supply chains to access.

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### Endnotes

- 1 The authors thank two anonymous referees for criticisms on an earlier draft of this article.
- 2 US\$1 was equivalent to about R7.32 at the time of writing this article (The Universal Currency Converter, 2006).

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# **APPENDIX 1: POTENTIAL CONSTRAINTS THAT LIMIT THE COMPETITIVENESS OF THE FORMAL ORGANIC CROP SUPPLY CHAIN ACCESSED BY EFO FARMERS, KWAZULU-NATAL, 2004.**

Rank the following constraints on organic cropping and marketing from 1 to 3 where 1 is no problem and 3 is a severe problem (tick where appropriate):

Constraint	1	2	3	Constraint	1	2	3
Livestock damage crops				Inputs not available at affordable prices			
Uncertain climate (e.g. drought)				Tractor is not available when I need it			
Uncertain prices for products sold to pack-house				Cannot find manure to purchase			
Uncertain prices for products sold to other markets <sup>1</sup>				Cannot find labour to hire			
More work than the family can handle				Cannot access more cropland			
Lack of cash and credit to finance inputs				Delays in payment for products sent to pack-house			
Lack of information about producing organic crops				Lack of bargaining power over product prices at the pack-house			
Lack of information about alternative markets				Lack of information about consumer preferences for our organic products			
Lack of proper storage facilities				Pack-house does not reward me fully for my own product			
Lack of affordable transport for products							
Lack of telephones to negotiate sales							

<sup>1</sup>Other markets refer to hawkers and the Isipingo market that is 40 kilometres from Umbumbulu.

## APPENDIX 2: REAL SHARES OF THE CONSUMER'S RAND FOR THE THREE CROPS IN THE FORMAL ORGANIC CROP SUPPLY CHAIN, KwAZULU-NATAL, 2001-2004 (2003-2004 SEASON = 100)

### A. AMADUMBE

Year	Farm price/kg (R)	Farmer's share	Pack-house price/kg (R)	Pack-house share	Retailer's price/kg (R)	Retailer's share
2001-02	2.50	37%	4.53 <sup>a</sup>	30%	6.76 <sup>b</sup>	33%
2002-03	3.00	39%	5.17 <sup>a</sup>	28%	7.72 <sup>b</sup>	33%
2003-04	3.64	45%	5.39	22%	8.04	33%

### B. SWEET POTATOES

Year	Farm price/kg (R)	Farmer's share	Pack-house price/kg (R)	Pack-house share	Retailer's price/kg (R)	Retailer's share
2001-02	2.25	33%	4.53 <sup>a</sup>	34%	6.76 <sup>b</sup>	33%
2002-03	2.80	36%	5.17 <sup>a</sup>	31%	7.72 <sup>b</sup>	33%
2003-04	3.64	45%	5.39	22%	8.04	33%

### C. POTATOES

Year	Farm price/kg (R)	Farmer's share	Pack-house price/kg (R)	Pack-house share	Retailer's price/kg (R)	Retailer's share
2001-02	2.50	31%	5.38 <sup>a</sup>	36%	8.03 <sup>b</sup>	33%
2002-03	3.00	33%	6.14 <sup>a</sup>	34%	9.16 <sup>b</sup>	33%
2003-04	3.35	35%	6.40	32%	9.55	33%

Note: <sup>a</sup> Prices calculated based on the vegetable CPI obtained from Statistics SA (2005) with 2003-04 as the base year (see Appendix 3 on page 24).

<sup>b</sup> Prices calculated based on the margin of 33% between the selling price and the price paid to the pack-house as provided by the retailer.

### **APPENDIX 3: REAL SHARES OF THE CONSUMER'S RAND FOR THE THREE CROPS IN THE INFORMAL ORGANIC CROP SUPPLY CHAIN, KWAZULU-NATAL, 2001-2004 (2003-2004 = 100)**

#### **A. AMADUMBE**

Year	Farm price/kg	Farmer's share	Hawker's price <sup>a</sup>	Hawker's share
2001-02	2.50	54%	4.64	46%
2002-03	2.50	45%	5.57	55%
2003-04	2.86	44%	6.50	56%

#### **B. SWEET POTATOES**

Year	Farm price/kg (R)	Farmer's share	Hawker's price/kg <sup>a</sup> (R)	Hawker's share
2001-02	2.14	46%	4.64	54%
2002-03	2.14	38%	5.57	62%
2003-04	2.50	39%	6.50	61%

#### **C. POTATOES**

Year	Farm price/kg (R)	Farmer's share	Hawker's price/kg <sup>a</sup> (R)	Hawker's share
2001-02	2.50	54%	4.64	46%
2002-03	2.50	45%	5.57	55%
2003-04	2.86	44%	6.50	56%

Note: <sup>a</sup>Prices were collected from Hawkers at Isipingo, South Coast Market, KwaZulu-Natal.

## APPENDIX 4: ESTIMATED ACCOUNTING NET RETURNS (IN RANDS), 2003-2004 SEASON, KWAZULU-NATAL

### A. PACK-HOUSE NET RETURNS

	Amadumbe	Sweet Potatoes	Potatoes
Selling price/kg	5.39	5.39	6.40
Less Farm price/kg	3.64	3.64	3.35
	<b>1.75</b>	<b>1.75</b>	<b>3.05</b>
Less Labour cost/kg	0.12	0.12	0.12
Less Transport cost/kg	0.14	0.14	0.14
<b>Estimated net return/kg</b>	<b>1.50</b>	<b>1.50</b>	<b>2.79</b>

### B. HAWKERS' NET RETURNS SELLING AT ISIPINGO, SOUTH COAST, KZN

	Amadumbe	Sweet Potatoes	Potatoes
Selling price/kg	6.50	6.50	6.50
Less Farm price/kg	2.86	2.50	2.86
	<b>3.64</b>	<b>4.00</b>	<b>3.64</b>
Less Transport cost/kg	0.50	0.50	0.50
Less Storage cost/kg	0.50	0.50	0.50
Less Labour cost/kg	0.93	0.93	0.93
<b>Estimated net return/kg</b>	<b>1.71</b>	<b>2.07</b>	<b>1.71</b>

### C. EFO FARMERS' NET RETURNS SELLING THROUGH THE PACK-HOUSE

	Amadumbe	Sweet Potatoes	Potatoes
Selling price/kg	3.64	3.64	3.35
Less Tractor or draught power/kg	0.86	0.56	0.56
Less Manure cost/kg	0.23	0.23	0.23
Less Labour cost/kg	1.28	0.99	0.99
Less Transport cost/kg	0.42	0.42	0.42
<b>Estimated net return/kg</b>	<b>0.85</b>	<b>1.44</b>	<b>1.15</b>

**D. EFO FARMERS' NET RETURNS FARMERS SELLING THROUGH HAWKERS**

	<b>Amadumbe</b>	<b>Sweet Potatoes</b>	<b>Potatoes</b>
Selling price/kg	2.86	2.50	2.86
Less Tractor or draught power/kg	0.86	0.56	0.56
Less Manure cost/kg	0.23	0.23	0.23
Less Labour cost/kg	0.35	0.06	0.06
<b>Estimated net return/kg</b>	<b>1.42</b>	<b>1.65</b>	<b>2.01</b>