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IMPROVING ACCESS BY SMALLHOLDER FARMERS TO ORGANIC CROP SUPPLY CHAINS: EVIDENCE FROM THE EZEMVELO FARMERS' ORGANIZATION, KWAZULU-NATAL, SOUTH AFRICA

by

TINASHE MUSHAYANYAMA

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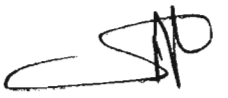
Signed 

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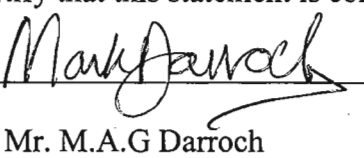
Signed 

Mr. M.A.G Darroch

(Supervisor)

ABSTRACT

The 48 members of the Ezemvelo Farmers' Organisation (EFO) in KwaZulu-Natal (KZN), South Africa (SA), that were fully-certified as organic farmers were surveyed during October-December 2004 to assess their perceived levels of satisfaction, trust, cooperation and commitment in a formal supply chain producing amadhumbes (a traditional vegetable tuber), potatoes and sweet potatoes for a major SA supermarket group. Empirical recursive models show that a high level of satisfaction in the working relationship results in these farmers trusting the pack-house agent more. High levels of trust, in turn, lead to higher levels of both commitment to, and cooperation in, the supply chain. A simultaneous-equation model showed that EFO farmers with higher levels of commitment tend to be more cooperative, and that members with higher levels of cooperation tend to be more committed toward the working relationship.

These results suggest that strategies to improve the working relationship with the pack-house agent need to promote satisfaction, trust, cooperation and commitment. For example, co-investment in better crop storage facilities at farm-level would promote satisfaction and hence trust. There is also scope for more cooperation in the planning of new organic crop products to grow and market, and to remove some price uncertainty by giving EFO farmers more information about prices that they will be paid by the pack-house agent in this supply chain. In addition, satisfaction and, hence, trust, cooperation and commitment may be improved by adopting a formal contract between the EFO farmers and the pack-house agent to replace the current, incomplete verbal contract that governs trading. Some issues that may be addressed in this contract are improved communication systems via regular meetings, renegotiations of trading terms so that farmers can benefit from positive changes in organic crop prices; guidelines for paying farmers

more quickly by the pack-house agent; mechanisms to trace crop quality to a specific farmer to avoid free riding; and penalties for breaching the contractual arrangements.

The 48 EFO farmers were also asked to give their perceptions of the main constraints on organic crop production and marketing in the formal organic crop supply chain. They perceived that uncertain climate, unavailability of tractor or draught power when needed, delays in payments for crops sent to the pack-house, lack of affordable inputs (particularly labour and manure), a lack of cash and credit to finance inputs, lack of affordable transport to market crops, more work than the family can handle, a lack of manure to purchase, and a lack of crop storage facilities and telephones to negotiate sales as the current top 10 constraints. Principal Component Analysis summarized the underlying dimensions in the 20 constraints ranked by these farmers as indicating "lack of market information and lack of market power"; "crop production expansion constraints"; "commitment to crop area expansion"; "lack of liquidity"; "lack of proper storage facilities"; and "lack of information about alternative markets".

Potential solutions to better manage these perceived constraints include: improved risk management practices (e.g., supplemental irrigation, water-harvesting and small boreholes), improving access to tractor services via improved tractor scheduling or using local contractor services, quicker pack-house delivery payments, improving quality inspection at the departure points at EFO farm-level to reduce crop rejection rates and "free riding" by producers of lower quality organic crops, more interaction with the retailer to promote sales of organic crops, providing advice on how the EFO farmers can improve their bargaining power, and providing more information (e.g. crop prices) about other organic markets and changing consumer

preferences. Apparently, the costs and benefits of these potential solutions, and how they will be financed, need to be evaluated.

Real accounting marketing margins since 2001 showed that the farmer's share of the consumer's rand for the 48 fully certified organic EFO farmers rose, while their net returns (selling price less accounting costs) were lower than those of the pack-house agent and hawkers selling at the Isipingo market on the South Coast of KZN. Net returns for the 48 EFO farmers also seemed to be relatively higher if they sold through the informal supply chain (hawkers) rather than the formal supply chain. The EFO farmers' net returns may be improved by lowering operating costs and by aggressive marketing to customers willing and able to pay a price premium for organic crops. These farmers may also consider performing some of the marketing services themselves (e.g. crop cleaning, grading and packaging) if they have the skills and can access more finance. There are, however, hidden benefits from maintaining the formal supply chain relationship, as the pack-house agent helped to secure tractor services and fencing, and facilitates access to the retailer.

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INTRODUCTION

A marked increase in consumer demand for healthier foods in South Africa (SA) since 1999 has led local supermarket chains to look for new sources of organically (chemical-free) produced foods (Darroch, 2001; Business Times, 2004). Business Day (2005) reports that Woolworths has experienced growth in organic food sales of more than 50% year-on-year over the past two years, and now has more than 200 organic food products. Pick 'n Pay forecasts that the potential market for organic produce will constitute 5% of its total produce sales in the short-term, 10% in the medium-term, and up to 20% in the longer-term. It is anticipated that R135m worth of organic produce that is grown in SA will be sold locally and exported during 2005. Currently there are about 515 000 hectares of farmland planted to organic crops in SA, 77% of which have been certified since 2001 (Business Day, 2005).

The increased demand for organic foods in SA may present opportunities for limited resource, smallholder farmers who already practice organic farming methods to earn higher incomes by producing crops for this niche market. Research on ways to integrate smallholder farmers into such markets can, in turn, help to improve knowledge management, raise household incomes and stimulate economic growth (Deutsche Gesellschaft fur Technische Zusammenarbeit (DGTZ), 2002). These outcomes would also help to develop sustainable rural livelihoods and to contribute to alleviating rural poverty. This requires analyzing organic crop supply chains in order to identify key relationship aspects that need to be better managed, and what links need to be strengthened.

Supply Chain Management (SCM) encompasses all activities associated with the flow and transformation of goods and services from the raw material stage through to the end user and

the associated bi-directional flow of information. The SCM process involves integrating these activities through improved working relationships to achieve a sustainable competitive advantage for the players in the chain (Claro *et al.,* 2003; Erik *et al.*, 2003). Supply chain players need to openly share information that facilitates their ability to jointly meet the needs of the end users of their products (Spekman *et al.*, 1998). Central to SCM is the dual flow of information, the drive to meet the needs of the end user and the importance of the working relationships between participants in the marketing system (Claro *et al.,* 2003; Van Donk, 2003; Champion & Fearne 2001).

This study focuses on finding ways to improve the performance of the formal organic crop supply chain currently accessed by 48 smallholder farmers in the Umbumbulu district of KwaZulu-Natal (KZN), SA, who are members of the Ezemvelo Farmers' Organisation (EFO) and are fully certified to grow organic crops. The province of KZN faces disproportionately large development challenges; for example, in 2000, it was the province with the third highest rate of unemployment (39%) in SA (KZN Department of Economic Development and Tourism, 2000), and 54% of its population had an income below the international poverty threshold of US$1 (equivalent to about R7 at the time of writing in 2005 (The Universal Currency Converter, 2005)) per person per day as identified by the World Bank (2000). Most of the 48 EFO farmers are women, and their income from organic crop farming currently averages less than R1000 per farmer per annum (Ford Foundation Project Brief No. 1, 2005). The research focuses on these EFO farmers because in 2001 they were the first smallholder organization to gain organic certification in SA. This means that the land on which they grow organic crops is free of prohibited substances, such as commercial fertilizers; the farmers and the pack-house that they supply keep detailed records of the methods and materials used in

the growing or processing of these crops; and all methods and materials are annually inspected (Modi, 2004).

The study first aims to analyse key working relationships between the 48 fully certified organic EFO farmers and the pack-house agent in the formal organic crop supply chain that they access to market amadhumbes (a traditional vegetable tuber), potatoes, and sweet potatoes. The pack-house agent sells the crops on their behalf to a major nationwide supermarket chain, and they also market these crops via informal supply chains to neighbours and hawkers. These EFO organic farmers were certified by an accredited agent, Africa's Farms Certified Organic (AFRISCO) (Modi, 2004). The study argues that satisfaction, trust, cooperation and commitment are key requirements for a successful long-term business relationship between EFO farmers and the pack-house agent. Satisfaction relates to an overall evaluation of the relationship between supply chain members, and is, therefore, an indicator of the benefits of their relationship (Skinner *et al.,* 1992). Trust exists when one party has confidence in an exchange partner's reliability and integrity (Morgan & Hunt, 1994). Trust thus creates the belief that the partner will act in a way that results in positive outcomes for the other party and will not take unexpected actions that result in negative outcomes (Anderson & Narus, 1990).

Cooperation describes a process by which parties develop mechanisms to interact and form business relationships for mutual benefit. Higher levels of cooperation are expected to improve business coordination, leading to better human and product performance (Smith *et al.*, 1995). Commitment is shown when a supply chain partner believes that an ongoing business relationship with another player is so important as to warrant trying to maintain it (Morgan & Hunt, 1994). This implies that 'enduring commitment is a basic requirement for successful

supply chain implementation' (Kwon & Suh, 2005:27). Many authors have tried to model these supply chain relationships using recursive models (see Kwon & Suh (2005) for a summary), but *none have used a simultaneous-equation approach* to meaningfully validate the behavioural variables in these relationships. Locally, for example, Hardman *et al.* (2002) applied empirical recursive models showing that high levels of trust lead to high levels of cooperation that, in turn, produce high levels of commitment in the SA fresh apple export value chain. Masuku *et al.* (2004) showed that cooperation depended on trust, and commitment depended on cooperation, between smallholder sugarcane farmers and millers in Swaziland. This study, therefore, *extends past international and local research* by modelling both recursive and simultaneous relationships between trust, commitment and cooperation in a supply chain. To the author's knowledge, it is the first attempt in the literature on SCM to try and estimate the simultaneous complex interrelationships between these variables.

The second aim of the study is to identify the main factors that the 48 fully certified organic EFO farmers perceive constrain organic crop farming and their access to the formal organic crop supply chain in KZN. Scialabba & Hattam (2002) show that there are several challenges facing organic crop farming in SA, such as a lack of qualified inspectors and auditors that decreases the ability to ensure compliance with organic agriculture standards, weak infrastructure, restrictive costs of certification, and low consumer awareness of the benefits of organic agriculture. Past research by Hardman *et al.* (2002), Boehlje *et al.* (1999), Doz (1996), and O'Keefe (1998) suggests that the process of building trust, cooperation and commitment in a supply chain will be enhanced if the players monitor changes in the external and internal environment, and evaluate the risks that they face due to participating in the supply chain. This helps them to identify key constraints on supply chain competitiveness over time, and how best to try and adjust to, and to manage, these constraints for mutual benefit. Again, to the best of the author's knowledge, this is the first study in SA of the constraints that smallholder

farmers perceive limit the competitiveness of formal supply chains that they access to sell organically produced crops.

Finally, the study quantifies trends in the farmer's share of the consumer's Rand, and marketing margins (MMs), in the formal and informal supply chains for the three organic crops since 2001. This information will help to evaluate the incidence of, and possible reasons for, any changes in the relative net returns earned by the players in these supply chains. Changes in MMs usually result from changes in the costs and profitability of the processing and marketing of farm commodities (Tomek & Robinson, 2003). Estimates of the costs and returns for the formal and the informal organic crop supply chains accessed by the EFO farmers may show differences in the incentives to use each supply chain.

The next chapter gives an overview of the EFO and a literature review of supply chain relationships, potential sources of risk in organic crop farming, and factors affecting MMs. Chapter 2 describes data sources, develops a conceptual model of relationships between satisfaction, trust, cooperation and commitment, and specifies the study research hypotheses for these relationships. Chapter 3 reports the results comparing estimated recursive and simultaneous-equation models of these relationships. Chapter 4 discusses the 48 fully certified organic EFO farmers' perceptions of factors that constrain the competitiveness of the formal organic crop supply chain in KZN. Chapter 5 then describes trends in the MMs and net returns for the formal organic crop supply chain in KZN relative to the two informal (neighbours and hawkers) supply chains. A concluding section discusses some management and policy implications of the results.

CHAPTER 1

OVERVIEW OF THE EZEMVELO FARMERS' ORGANISATION, AND REVIEW OF LITERATURE

This chapter first describes the EFO, the 48 fully certified organic farmers' contractual arrangements in the formal organic crop supply chain, and the structure of the current supply chains that they access. It then reviews literature on SCM, with specific focus on the supply chain concept, operational aspects and power issues, competitive advantage and relationship-based versus transaction-based marketing in the distribution of organic crop products. Finally, literature on potential sources of risk in organic farming, and in the theory of marketing margins (MMs) and their determinants is also discussed.

1.1. Description of EFO

The EFO was founded in 2001 as an organic produce organisation based in the Umbumbulu district near the city of Durban in KZN, SA. The main products of the EFO farmers are organic amadhumbes, sweet potatoes and potatoes. Currently there are about 150 members, of whom 48 are fully certified organic farmers who can sell formally through the pack-house. The EFO does not have much equipment, except for a tractor that members can use for tillage operations. Each member pays an annual subscription, or joining fee, of R10 toward a fund that is used to repair the tractor, pay the driver and for other running expenses. According to EFO farmers interviewed by the author during February 2004, organic amadhumbes are the most profitable crop and popular with consumers, although their production is relatively more labour-intensive than other crops in terms of land preparation before planting. Despite being

labour-intensive to grow, EFO farmers readily choose to produce the amadhumbe plant because it is free from major pathological problems (Modi, 2004).

Each member of the EFO produces organic crops independently. After harvesting, each farmer takes his/her produce to the local warehouse (usually at the home of an executive member of EFO) where it is weighed and a receipt for it issued by the EFO treasurer, before the produce is pooled with the produce of the other members. The EFO farmers work on a quota basis of production, such that in the event of failure by some members to meet the quota, they may supplement by allowing another member to deliver on their quota. The EFO keeps no formal financial records and there is no provision in the constitution for an external audit of the organization's financial records. The EFO farmers have limited control over the pricing of their organic crops and also have limited negotiating power due to their lower levels of literacy and a lack of information about prices and demand in other formal organic markets. Furthermore, relatively poorly developed infrastructure in the Umbumbulu district and inadequate quality control by some EFO farmers often reduces product quality and gross returns, and increases product wastage. Informal discussions with EFO farmers during February 2004 also suggest that the obstacles to organic crop supply chain performance include poor infrastructure, such as a lack of transport and poor quality roads and bridges; a lack of information on markets and prices; a lack of information about the pricing of products delivered to the pack-house; a lack of technical knowledge of markets, packaging, logistics and post-harvest technologies; and inadequate control of product quality.

Through collectively gathering, grading, packing and storing produce, the EFO farmers have tried to improve the performance of their organic supply chain, but the following problems were observed by the author during February 2004: (a) *Incompatible goals* - the EFO farmers

want the produce to be graded by the pack-house agent at farm-level before delivery to the pack-house to try and achieve a price premium for the top quality produce or to develop a brand image; but in practice an executive member of the EFO grades the produce at farm-level and then the agent re-grades this produce at the pack-house, resulting in some rejected produce; (b) *Confusion over roles and rights* - for example, EFO farmers sometimes sell part of the organic produce through the pack-house agent and part direct to hawkers or local consumers. This causes conflict because the current agreement is that all organic produce should be sold through the pack-house agent; (c) *Differences in perceptions* on who the customer is, what the market wants, the objectives of other players in the chain and the role which other players have in helping the EFO organisation achieve its own objectives.

1.2 Supply chains for EFO organic crops

The EFO farmers market their produce via three supply chains: a formal supply chain that involves the pack-house agent in Pinetown and the retailer in Pinetown and Durban; an informal supply chain via hawkers at Isipingo on the South Coast of KZN, and another informal supply chain for direct selling by members both at Isipingo market and the surrounding community (see Figure 1.1 on page 10). An appraisal of the formal supply chain by the author in February 2004 indicated relatively poor organisation of physical distribution-related tasks, and that major core competencies such as logistics and transport were underdeveloped. As a result, the EFO has experienced only modest growth to date in terms of the number of fully certified farmers since the project began in 2001. The number of fully certified organic farmers has grown to 48, suggesting that there may be constraints/lack of incentives to participate. Difficulties in transportation and distribution logistics are more apparent in the formal supply chain because farmers have to make transport arrangements

with the KZN Department of Agriculture and Environmental Affairs to deliver crops to the pack-house that is about 60 kilometres away.

Some of the EFO farmers cited high reliance on the pack-house agent as a concern in the formal organic crop supply chain, to the extent that their produce sometimes stays too long in the fields until a purchase order is made, thus compromising product quality. The agent, in turn, sells the produce to a single nationwide retailer that sells to the final consumer. The prices received by the farmers are determined by the quality of the *pooled* produce. The produce often meets the required standards, but the EFO farmers have limited bargaining power in negotiating the product price because many of them lack information about prices and demand in other formal organic markets. More information about demand and prices in other markets may promote market contestability (potential competition constrains the pricing behaviour of incumbents (such as the pack-house agent in this case) (Baumol & Willig, 1986)) in the formal organic crop supply chain that, in turn, could generate more market-related prices for EFO farmers.

Money for crop sales received from the pack-house agent is pooled in the EFO's bank account and then regularly divided among the members *pro-rata* to what they have contributed in terms of product quantity, not product quality. Some of the produce is sold to local hawkers who then resell directly to consumers at markets such as Isipingo on the South Coast of KZN (see Figure 1.1). Selling through hawkers entails less time spent on quality inspection, and marketing is less costly, as hawkers use their own labour to harvest, grade and transport the produce. Figure 1.1 also shows that some EFO farmers assume the role of hawkers themselves by selling directly to consumers at the Isipingo market or to surrounding communities. These farmers could realize higher net returns if they could carry out the

hawking functions at similar costs to those incurred by hawkers. The two informal supply chains (selling through hawkers and farmers as hawkers) do not have to meet high quality organic crop standards like those in the formal organic crop supply chain.

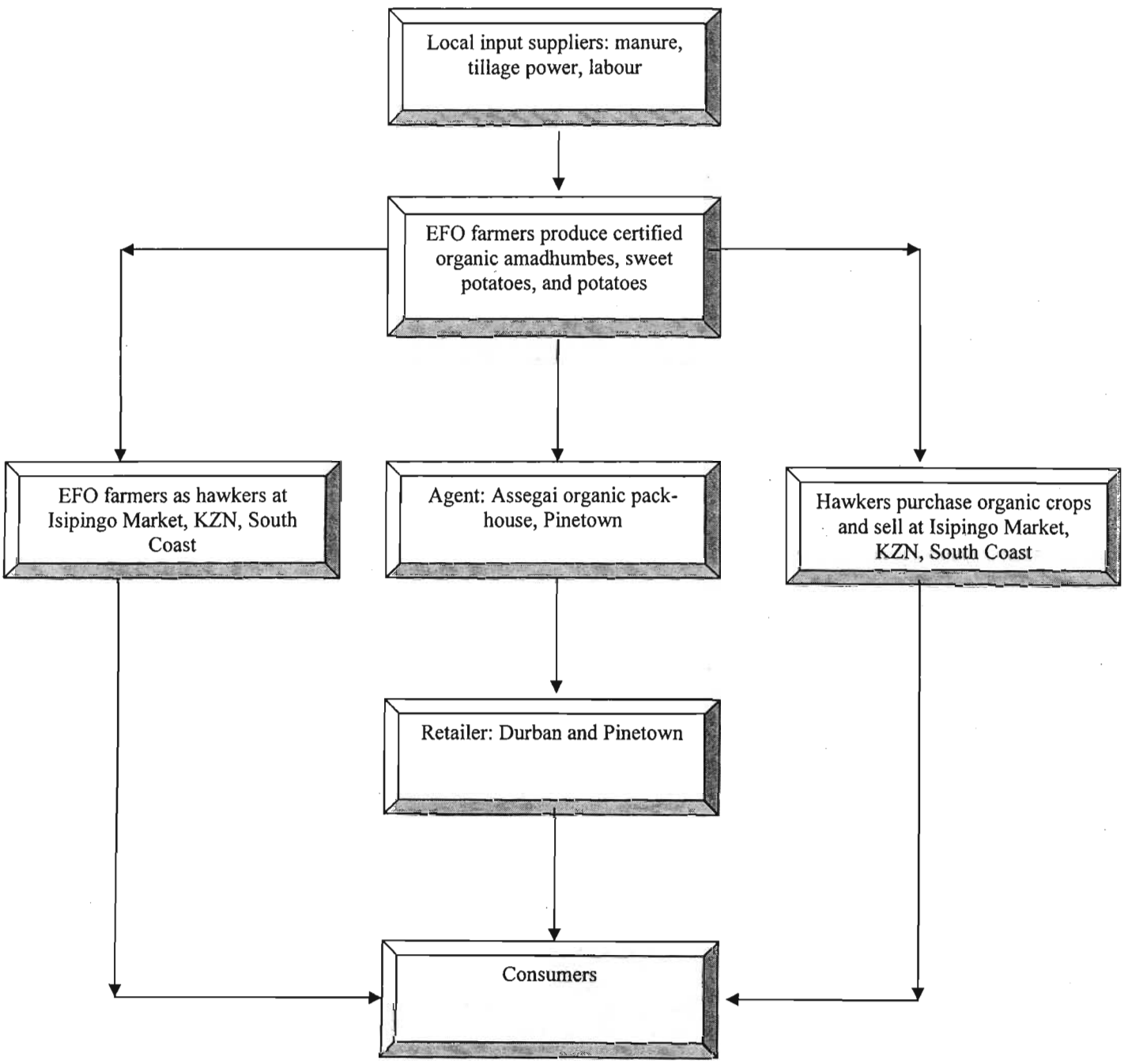


Figure1.1: Formal and informal organic crop supply chains used by EFO farmers

1.3 Contractual arrangements for EFO members in the formal organic crop supply chain

The 48 EFO farmers do not have a written contract that formalizes 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, and such an incomplete contract may have a negative effect on the long-term economic relationship (Hart & Moore, 1998). At present, the EFO farmers have only a verbal agreement upon which their sales to the pack-house are based. This tacit contract is based on their working relationship since 2001, owing to the assistance they have received from the agent, when investing in specific assets like organic certification and fencing. The pack-house agent, when ready to buy the produce, informs the EFO executive, who in turn sends the message to other members. This process is sometimes not timely, due to poor infrastructure in the Umbumbulu district. As a result, 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. The verbal contract does require an individual member who cannot meet his/her quota to supplement the deficit from other members who have crops available.

The verbal contract does not specify a renegotiation of trading terms clause. This puts the EFO farmers at a disadvantage, since they cannot benefit from positive price movements in organic crops. In many instances, the guaranteed price agreed at the onset of the season does not link with the time of call or quality of produce delivered thereafter and, therefore, omits the possibility of offering price premiums for timely deliveries and good quality produce. Furthermore, the verbal contract does not state when title, value and risks associated with 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 risk with the farmers (Gadzikwa *et al.*, 2005). The pack-house agent re-grades the produce and calls upon farmers to collect rejected crops several days after the sale has passed, often when it is no longer saleable. Sometimes this rejected produce will be sold at a very low price that farmers accept because they would otherwise incur the costs of collecting the produce that has deteriorated.

The crops are graded at farm-level prior to delivery to the pack-house. At present, a member of the EFO executive is tasked to do the grading, yet his/her terms of service are not explicit about procedures, remuneration for such services, and when such grading should be rendered. If some produce has been rejected, the verbal contract does not specify handling procedures, and one of the fundamental weaknesses of the agreement is the pooling of farmers' produce before grading, making 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 EFO 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 verbal contract also lacks penalties for breaching the contractual arrangements and clear guidelines to settle disagreements arising from the misinterpretation of the contact, 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, delays in payment for produce sent to the pack-house, and delivery of poor quality crops by some members due to a lack of individual consignment.

1.4. Review of the relevant SCM literature

This section reviews the relevant literature on supply chain concepts, operational aspects of power issues in supply chains, and relationship structures in product marketing. This literature covers the economics of supply chains and transaction costs, and incorporates marketing, finance, organisational behaviour, strategy, and logistics principles.

1.4.1. The supply chain concept

SCM encompasses all activities associated with the flow and transformation of goods and services from the raw material stage through to the end user, and the associated bi-directional flow of information. It thus integrates activities through improved relationships to achieve a sustainable competitive advantage (Claro, *et al.,* 2003; Erik *et al.*, 2003). Supply chain players need to openly share information that facilitates their ability to jointly meet end user's needs (Spekman *et al.*, 1998). Central to SCM is the dual flow of information, the drive to meet the needs of the consumer and the importance of the relationships between participants in the marketing system (Claro, *et al.,* 2003; Van Donk, 2003; Champion & Fearne 2001). This implies that any study of a supply chain system cannot be divorced from the consideration of the types of relationships that exist between the participants in the chain. In Tan's (2001) view, SCM focuses on how firms utilize their supplier's processes, technology, and capability to enhance competitive advantage and the coordination of the manufacturing, logistics and materials management functions within an organisation. Supply chain analysis thus focuses on effective purchasing and distribution, long-term relationships between the trading partners, and the operational integration of trading partners (Van Donk, 2003).

A well-functioning supply chain should satisfy the goals of both the buyers and the sellers (see Figure 1.2 overleaf). Since understanding buyer and seller goals and the means to synchronise them is crucial, Van Donk (2003) identified the following four aspects of satisfying these goals:

- Physical supply, which deals with the physical flow of goods through the organization and focuses on the location of warehouses, capacity of people, mode of transport, arrangement of machines, etc;
- Planning and control issues such as production and transportation planning to meet due dates, forecasting, and decisions regarding delivery frequencies, amount of delivery, ordering process and monitoring orders;
- Organisation and relation with respect to the lines of authority and divisions of responsibility and the allocations of decisions with respect to the flow of goods in and between two organisations. The type of relationship that exists between and among the supply chain players is key to the success of the supply chain, and hence SCM principles advocate close collaboration among all supply chain players. Mukhtar *et al.* (2002) state that distrust and wariness among players is prevalent in many instances, resulting in supply chains ranging from arms-length negotiations to full collaboration or integration;
- The flow of information, which is probably paramount in terms of long-term sustainability of the supply chain. Here the distribution of information related to the flow of goods in and between two organisations is vital. The question is, what kind of information systems are used? Central to this is the use of information and data in the administrative process to control and record the flow of information

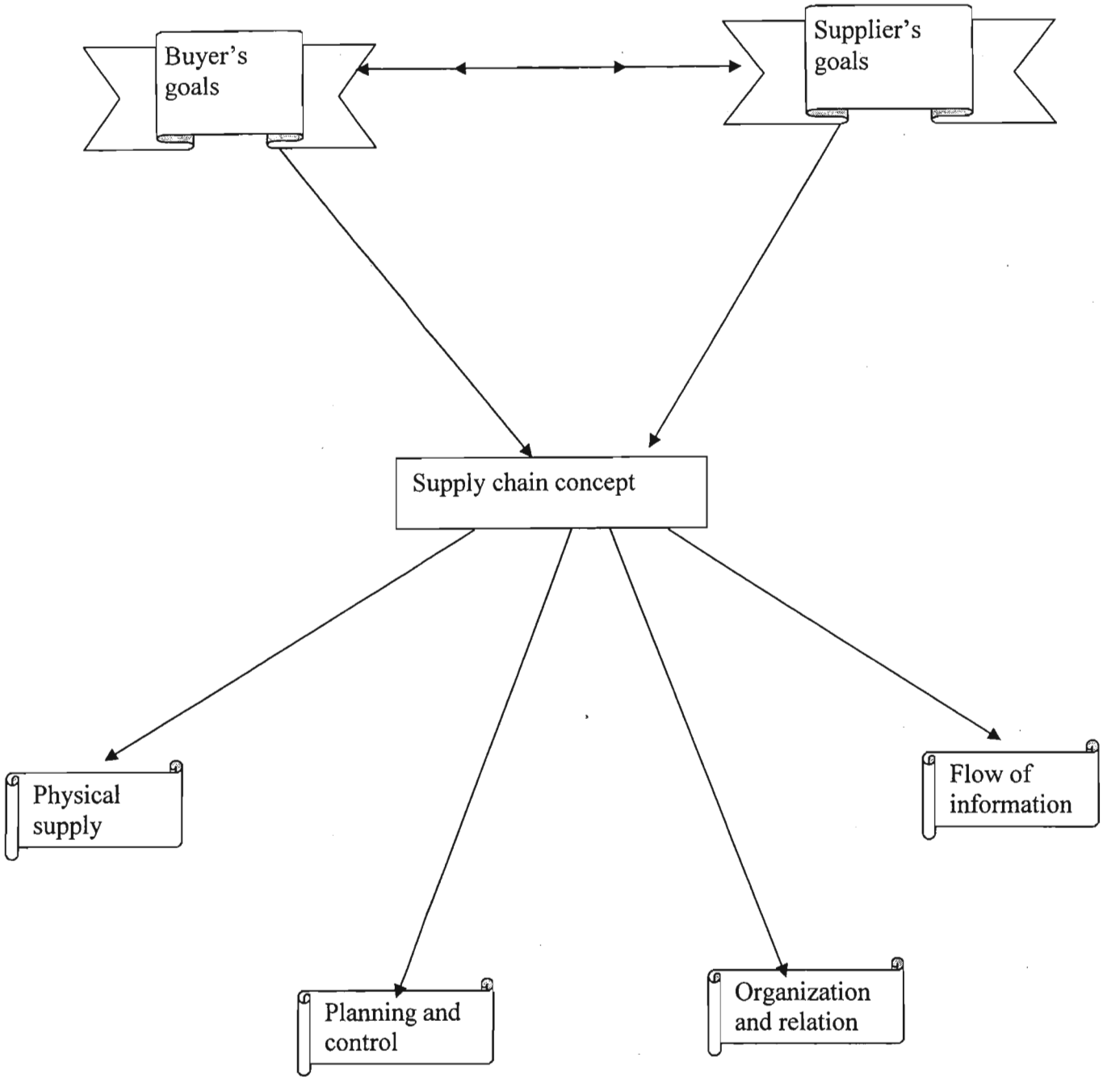


Figure 1.2: The supply chain concept
Source: Van Donk (2003:227).

Supply chain management should treat all organisations within the value chain as a unified virtual business entity, including such activities as planning, product design and development, sourcing, manufacturing, fabrication, assembly, transportation, warehousing, distribution, and post-delivery customer support (see Figure 1.3 overleaf). As competition intensifies, firms are increasingly focusing on core competences and outsourcing other activities, with the result

that SCM has become increasingly central to business effectiveness (Roberts, 2004). Figure 1.4 on page 17 shows some of the factors that have recently led to the increasing importance of SCM. Businesses can reduce both direct and indirect costs, e.g. labour and transport, and transactional costs (e.g. information searching) to stay in business, and need greater flexibility to adapt to change.

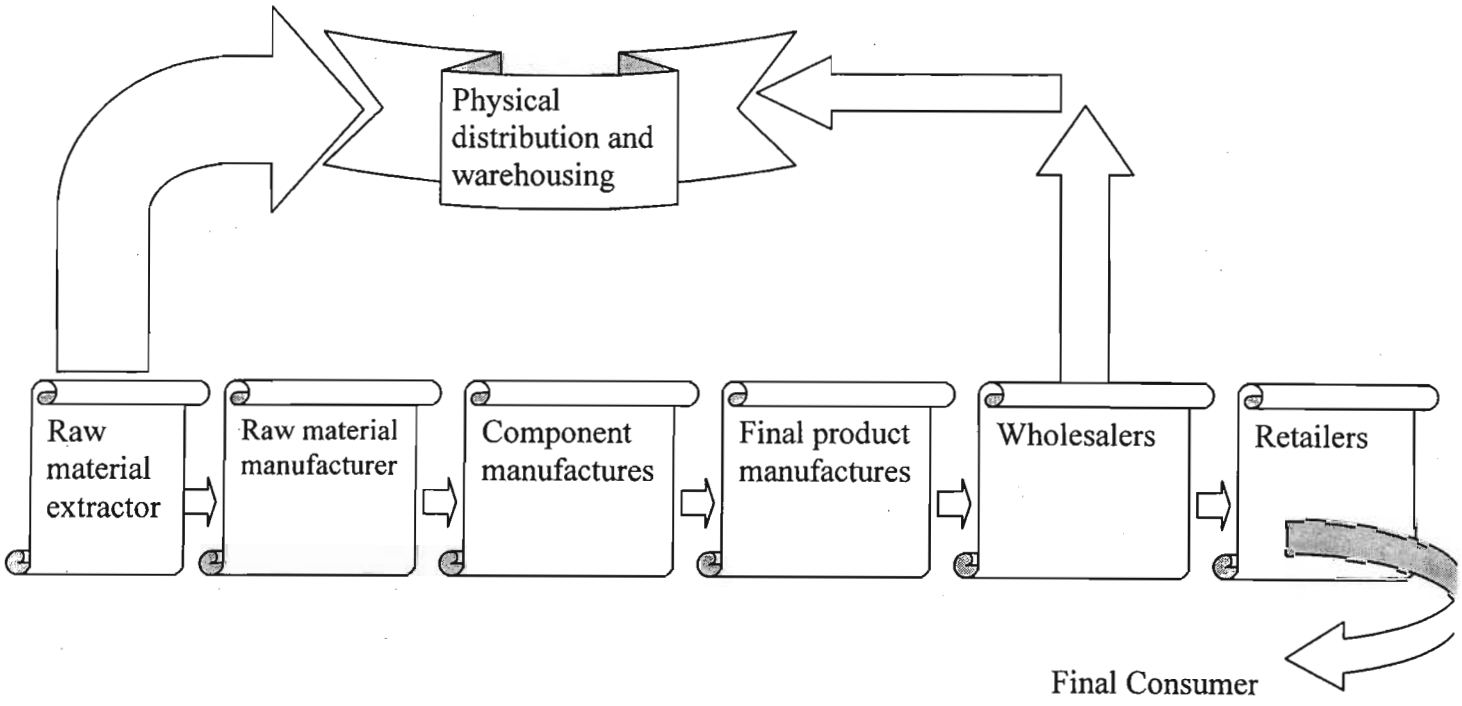


Figure 1.3: Activities and firms in a supply chain
Source: Tan (2001:40).

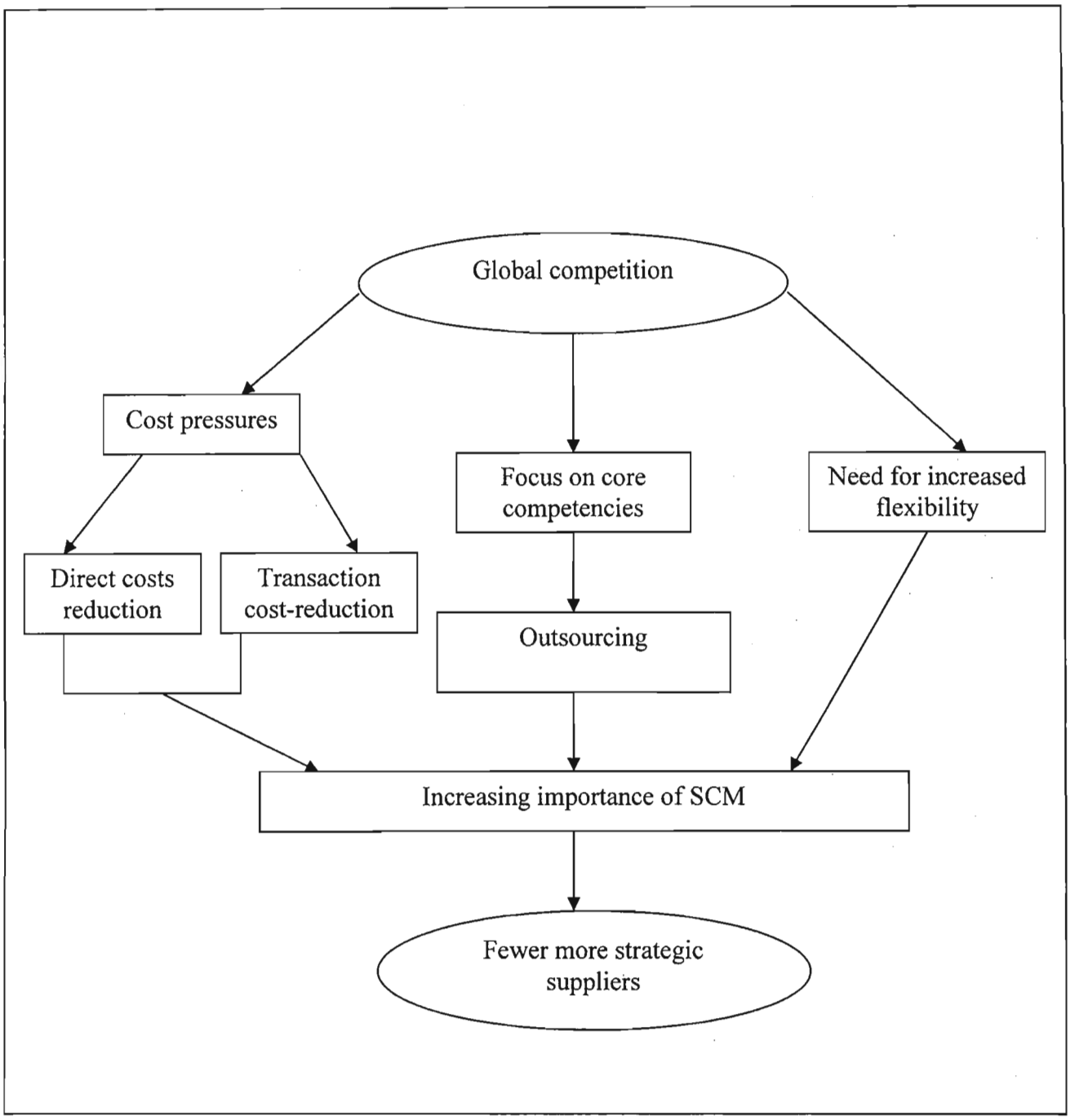


Figure1.4: Factors leading to the increased importance of SCM in modern business
Source: Roberts (2004).

1.4.2 Operational aspects and power issues in supply chains

Operational aspects of a supply chain deal with the physical flow of goods, while planning and control, organisation and the flow of information support this flow (Van Donk: 2003). Another development in the SCM literature is the consideration of power exerted by different players in a supply chain. According to Cox (2003), a full understanding of the long-term relationships of channel members is a function of the analyst's knowledge of the buyer-

supplier power that exists along the supply chain. In analysing the EFO formal organic crop supply chain, discussions with EFO members indicated that they might be lacking bargaining power in dealing with the agent. The power matrix derived by Cox (2003) points out that all buyers' and suppliers' relationships are predicted on the relative utility and the relative scarcity of the resources that are exchanged between the two parties. Cousins (2002) echoed this sentiment by showing that some authors advocate studying 'the economic perspective' of relationships management, where inter-organisational relationships are based on the economic power of exchanges brought about by the differing sizes of organisations and, therefore, economic power in the market place. There is thus a need to explore the impact of such relationship profiles or relationship structures on supply chain performance.

1.4.3 Supply chain relationship structures

Collaborative relationships can enhance supply chain performance, implying that the scope of supply chain enhancement depends on the nature of the supplier relations in the chain in which the closeness of the relationships is one of the defining factors. Long-term cooperation can produce more net benefits for the exchange partners than are available from the traditional competition-based arrangements. Such long-term cooperation has to be accompanied by the commitment to the relationship, and proactive customers and suppliers. These benefits often enhance the competitive position of both the producer and the buyer resulting in a 'win-win' situation (Burnes & New, 1996; Mukhtar *et al.*, 2002).

Power also affects the strengths of supply chain relationships and, hence, the performance of the supply chain (Maloni & Benton, 2000). Following Mukhtar *et al.* (2002), the interaction of power and collaboration can give rise to the relationships shown in Figure 1.5 overleaf. A

clear and well-structured framework for determining costs, prices and profit for both sides should be present if a partnership relationship is to be sustainable (Burnes & New, 1996).

Power	Low Collaboration	High Collaboration
Buyer Dominance	Buyer dominated arms-length	Buyer dominated collaboration
Symmetrical	Arms-length	True collaboration
Supplier Dominance	Supplier dominated arms-length	Supplier dominated collaboration

Figure 1.5 Relationship profiles in supply chains
Source: Mukhtar *et al.* (2002).

The buyer dominated arms-length category in figure 1.5 may describe the current EFO formal supply chain. The pack-house agent has dominant power attributes relative to the EFO farmers that give the buyer bargaining leverage because of the farmers' investments in specific assets that locked them in, and also due to the pack-house agent's superior literacy relative to the farmers. A well-functioning supply chain would be that which thrives at interdependence (symmetrical power in Figure 1.5). According to Cox (2003), both the supplier and the buyer should possess enough resources that require the two parties to the exchange to work closely together, so that neither party can coerce the other. Long-term sustainability of partnership relationships thus requires clear strategy, that the partnership

should be underpinned by performance, and that the supplier should know how to cope with different approaches of its customer (Burnes & New, 1996).

1.4.4 Supply Chain Management and competitive advantage

A company's relative cost position and overall competitiveness is linked to the industry supply chain system and to value created for the customer (Mould & Starr, 2000). Identifying the primary activities that create value, and exceed the cost of doing so for customers, should be the chief objective. Increasingly, businesses see competition as being between competing supply chains. Many businesses fail, not because they cannot operate their internal value chain activities economically, but because they are embedded within an uncompetitive supply chain (upstream value chains or downstream value chains). There are linkages between activities such that the way one activity is performed may spill over to affect the costs of performing other activities. In agribusiness for example, producers may be able to reduce the costs of production by identifying the impact of an early step in the supply chain on a later production step (Thompson & Strickland, 1998). A focus on better SCM may allow an organization to realize the advantages of backward vertical integration while overcoming its disadvantages. The single most important prerequisite, however, is the change of business culture of all members in the supply chain in order to make it conducive. A culture that emphasizes seeking good, short-term company-focused performance appears to be in conflict with the objectives of SCM. All contributors in the value chain must benefit, thus effective SCM must rest on the twin pillars of trust and communication (Tan, 2001).

In response to increasing global competition, mergers and acquisitions that create redundant logistics capability and technology, firms may adopt SCM to move beyond cost reduction into

the domain of real manufacturing efficiency (Tan, 2001; Roberts, 2004). The traditional buyer-seller relationship that emphasises multiple sourcing, competitive bidding and use of short-term contracts may be adversarial (Lascelles & Dale, 1989). This traditional relationship tends to focus on the short-term view of the purchase price and quality of a product, instead of the long-term capabilities of suppliers. Following Figure 1.4, SCM should be adopted to acquire gains from reduced costs, focus on core competencies and greater flexibility (Roberts, 2004). A supply chain strategy also requires a customer-focused vision - Thompson & Strickland (1998) state that management's views and conclusions about the organization's future course, the customer focus it should have, the market position it should try to occupy and the business activities to be pursued must be contained in the company's strategic vision. Tan (2001) views a customer-focused corporate vision as a key facilitating mechanism in the evolution of SCM, which drives change throughout a firm's internal and external linkages (see Figure 1.6 overleaf). A business should, hence, view its supply chain practices as a portfolio of competencies.

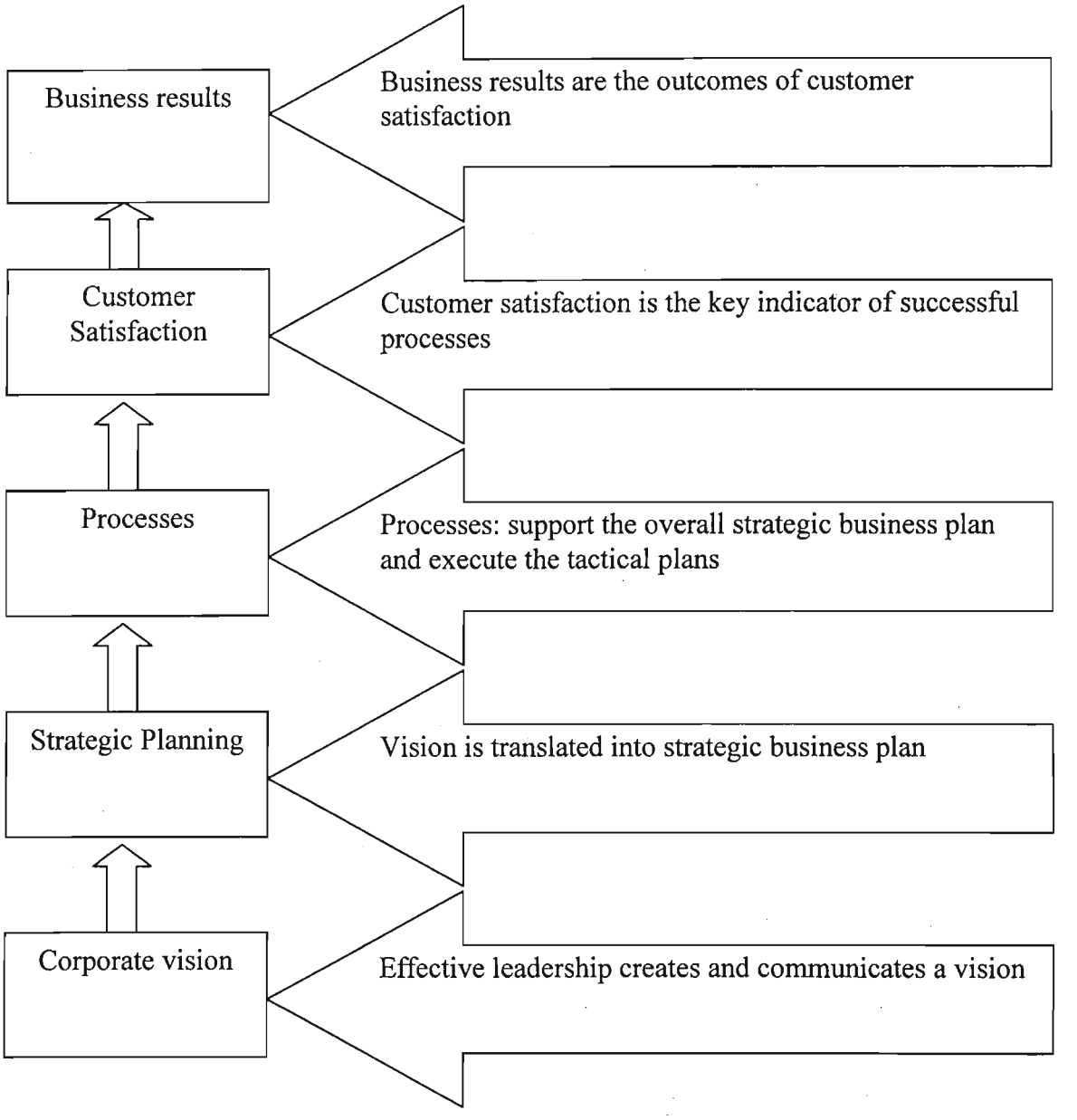


Figure 1.6: Strategic vision of SCM
Source: Adapted from Tan (2001).

1.4.5 Relationship-based marketing versus transaction-based marketing

The supply chain concepts discussed thus far hinge upon relationship-based marketing, where the focus is on the development and maintenance of long-term, cost effective relationships with individual customers, suppliers, employees and other supply chain partners for mutual benefit. A

practical example of this is the Zimbabwe Cotton Marketing Board (ZCMB), which realized that cotton spinners, who were the customers of the brokers, merchants and trading houses handling cotton, wanted advice from their suppliers on the best cotton characteristics to produce a given quality of spun product. The ZCMB established a 24-hour advisory service for these middlemen, and so helped their customers, the middlemen, to help the spinners. Thus, ZCMB enabled their customers to offer a level of service to spinners which others found difficult to match (Crawford, 1997). At the other extreme is transaction-based marketing, which involves buyer-seller exchanges characterised by limited communications and little or no ongoing relationship between the parties. Following Rix *et al.* (2002), these two approaches to marketing are contrasted in Table 1.1 on page 24.

Despite the benefits – particularly long term increase in trust, cooperation and commitment - of relationship-based marketing, there are some pitfalls. Firstly, the time lapse between purchases may be so long that meaningful relationships are difficult and expensive to develop and maintain. Secondly, relationship-based marketing is more time consuming than transaction-based selling due to preparation time and information gathering. Finally, sometimes the profit margins and terms achieved on individual contracts under the relationship-based approach may not be as attractive compared with the supplier or buyer being interested in the sale only.

Table 1.1 Comparison of transaction-based marketing and relationship-marketing strategies

Transaction based marketing	Relationship based marketing
Each sales contact is a separate event and its main aim is to "make and profit from this sale".	Sales contacts are linked, continuous, each one a step in the developing relationship; their combined aim is to profit from ongoing sales, and the lifetime value of the customer is recognised.
Channel members mainly consider their own needs.	Channel members consider the other's needs first and then their own.
The time horizon is short.	The time horizon is long-term.
The marketing approach is mainly one-way from the seller to the buyer or otherwise.	The marketing approach is two way and consultative, with both buyer and seller actively participating.
Low levels of trust between the parties because their aims are unrelated and often in conflict; some members may often feel manipulated.	High level of trust is progressively built between channel members because each understands and respects the other's aims.
Both parties see the benefits from the purchase as immediate and relatively small.	Both parties see potential and significant long-term benefits from the relationships.
There is little or no commitment by either party to the other; neither party is prepared to risk aligning themselves with the other.	A significant level of commitment by each party is progressively developed; both recognise and accept a degree of risk in building the relationship.

Source: Rix *et al.* (2002).

The next section extends the focus on supply chain relationships by discussing the key concepts of satisfaction, trust, cooperation and commitment in working relationships.

1.4.6 Relationship satisfaction and trust

For members to perceive high levels of trust, they should also perceive high overall satisfaction with the relationship (Schroder *et al.,* 2000). Satisfaction is the overall evaluation of the relationship between channel members, and, therefore, a measure of the benefits of the buyer-seller relationship (Skinner *et al.,* 1992). In this study, these benefit attributes include product quality assessment, provision of information and timely payments for products sent to the pack-house. Trust reflects the extent to which one party believes that its requirements will be fulfilled through future actions undertaken by the counterpart (Anderson & Weitz, 1989). It shows an individual's confidence in the goodwill of others and belief that others will make efforts consistent with the groups' goals. Anderson & Narus (1990) define trust as a firm's belief that another company will perform actions that will result in positive outcomes for the firm and will not take unexpected actions that result in negative outcomes. Trust, therefore, refers to the shared belief that in the long run, rewards will be distributed fairly among partners. When trust is operative, the risk of opportunism (i.e., getting advantages in an unprincipled way) is reduced. Long term relationships and trust encourage effective communication between players in the supply chain (Claro *et al.*, 2003).

Without trust there is a culture of suspicion in working relationships (Mason & Lefrere, 2003). Hunt *et al.* (2002) found that mutual trust must be present before a strategic alliance can flourish. Relationships characterized by trust are so highly valued that potential supply chain partners will desire to commit themselves to the supply chain (Morgan & Hunt, 1994). An environment of trust is conducive to coordinative behaviour (Claro *et al.*, 2003), although Mason & Lefrere (2003) also argue that high levels of cognition-based trust may be a principal predictor of "free riding" (where one party may willingly take advantage of the

other's trust in him). In the long term, trust would breakdown if 'free riding' continues. The presence of trust implies that the actions or outcomes of the trading parties will be acceptable, serve the interest of all (Claro *et al.*, 2003) and reduce the *ex post* variable transaction costs of risk and monitoring. The concept of trust is well summarized by Cousins (2002) as consisting of: (1) *Contractual trust:* the trust that the other party will adhere to the points of the contract; (2) *Competence trust*: the trust that the other party has the capability to produce what the contract requires, and (3) *Goodwill trust*: the trust that the other party, if required, will perform tasks in excess of the agreed terms. Masuku *et al.* (2004) argue that the presence of goodwill trust may eliminate the need for formal business contracts that are relatively costly to write, monitor and enforce.

1.4.7 Relationship cooperation

Cooperation is a departure from the anchor point of discreteness that underlies spot-market transactions, toward a relational, bilateral exchange (Claro *et al.*, 2003). The outcomes of such cooperation are effective coordination, resulting in lower administrative costs and higher performance (Smith *et al.,* 1995). Thus, in relational bilateral exchange, cooperative behaviour entails activities undertaken jointly, and communication between the parties. Joint action comprises joint planning and joint-problem solving (Claro *et al.*, 2003). When one partner's actions influence the ability of the other to compete effectively, the need for jointly set goals, long-term plans, responsibilities and expectations increases. Cooperative relationships can enhance supply chain performance as the partners work together to achieve mutual gains (Anderson & Narus, 1990; Morgan & Hunt, 1994).

The scope of supply chain enhancement depends on the nature of the supplier relations in the chain, with the closeness of the relationships being one of the defining factors. Long-term cooperation may produce more net benefits for the exchange partners than are available from the traditional competition-based arrangements (Mukhtar *et al.*, 2002). Such long-term cooperation has to be accompanied by the commitment to the relationship, trust and proactive customers and suppliers. These benefits often enhance the competitive position of both the smallholder producer and the buyer resulting in a "win-win" situation (Burnes & New, 1996; Mukhtar *et al.*, 2002). The conceptual models of supply chain relationships discussed in chapter 2 section 2.1 assume that cooperative behaviour does not continue unless associated relationship maintenance (transaction) costs are relatively low (Smith *et al.*, 1995). This cooperative behaviour rests upon sharing information, knowledge, risks and profits (Mentzer, 2001), and it continues on the strength of trust. Stronger cooperative behaviour makes exiting from the business relationship undesirable, and causes a deeper commitment from the players to re-evaluate their linkages over time and to implement necessary changes to make the supply chain perform better (Doz, 1996).

The Key Mediating Variable (KMV) model proposed by Morgan & Hunt (1994) considers trust and commitment as the precursors of cooperation. In addition, cooperation depends on the relationship costs (in the EFO case this refers to membership fees, time attending meetings, increased input expenditure, etc.) that members incur to participate in the supply chain (Smith *et al.*, 1995). Members can have ongoing disputes about business goals, but continue to cooperate due to relatively low relationship maintenance costs. Mould & Starr (2000) emphasized that both parties to the cooperative relationship must have the required capabilities to deliver. If capabilities exist, the commitment of management and resources is required to cope with disagreements over working details and procedures. Without resources (both capital

and people), the benefits of a cooperative relationship will lose visibility and eventually the psychological and physical boundaries that separate organizations will overcome the links. Excessive cooperation has potential to bring bias, conformity and economic collusion (Smith *et al.*, 1995). Mould & Starr (2000) also point out that cooperation may demand the sharing of sensitive proprietary information.

1.4.8 Relationship commitment

Relationship commitment is where "an exchange partner believes that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it, that is, the committed party believes the relationship is worth working on to ensure that it endures indefinitely" (Morgan & Hunt, 1994: 23). This enduring desire to maintain a valued relationship (Moberg, 2003) implies some vulnerability for each party, as mistrust decreases commitment (KMV model) and shifts the transaction to one of more direct short-term exchanges. Loyalty leads to superior business performance, and requires commitment. In the KMV model, a partner committed to the working relationship will cooperate with the other because of the desire to make the relationship work. Conversely, commitment is an outcome of high levels of cooperative behaviour (Claro *et al.*, 2003; Hunt *et al.*, 2002; Smith *et al.*, 1995; Anderson & Weitz, 1991). The outcomes of commitment and cooperation can include higher motivation and an increased sense of belonging to the relationship. The development of trust, commitment and cooperation can be treated as a dynamic process where participants constantly evaluate their decision to continue in such a relationship (Claro *et al.*, 2003; Smith *et al.*, 1995). The next section discusses how identifying constraints to supply chain competitiveness can help to build trust, cooperation and commitment.

1.4.9 Perceptions of the main constraints that affect organic crop farming

Boehlje *et al.* (1999), Doz (1996), O'Keefe (1998) and Hardman *et al.* (2002) suggest that the process of building trust, cooperation and commitment in a supply chain will be enhanced if the players monitor changes in the external and internal environment, and evaluate the risks that they face due to participating in the supply chain. This helps them to identify key constraints on supply chain competitiveness over time, and how best to try and adjust to, and to manage, these constraints for mutual benefit.

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 study, and implies that risk includes 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 & 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 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. Typical barriers in the EFO case could include, low levels of literacy, high costs of inputs such as organic fertilizer, lack of English language skills to communicate, limited management skills, uncertainty about consumers' changing tastes, lack of access to formal organic markets, and a lack of resources like capital, skilled labour and crop storage facilities (Bhide, 2000; Matungul *et al.*, 2001; 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 of 98 articles on factors responsible for the success of small and medium-size businesses around the world by Nieuwenhuizen & Kroon (2003) 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 secure 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 from small business owners' lack of understanding of loan application procedures, or a private

lending institution's bias against financing such operations due to the relatively high costs of assessing and administering relatively small loans (Bannock, 2002).

The analysis of potential constraints to organic crop supply chain competitiveness in this study must, therefore, consider appropriate socioeconomic, institutional and farm-level barriers. The study hypothesizes that the sources of perceived constraints may 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 storage facilities, and lack of production and marketing information. If the supply chain players work together to overcome such constraints, they could improve their profit margins. These factors are discussed in more detail in Chapter 4 of this study.

1.4.10 The concept of the marketing margin (MM)

The MM can be defined as the price of a collection of marketing services that is the outcome of the demand for and the supply of such services (Tomek & Robinson, 1993). Figure 1.7 overleaf shows the MM as the difference between the primary demand and the derived demand for a commodity. Primary demand reflects the demand for all of the inputs in the final product, and is determined by the ultimate consumers, assuming that the final product is made from fixed proportions of the inputs and that the supply function of marketing inputs is fixed (Tomek & Robinson, 1993).

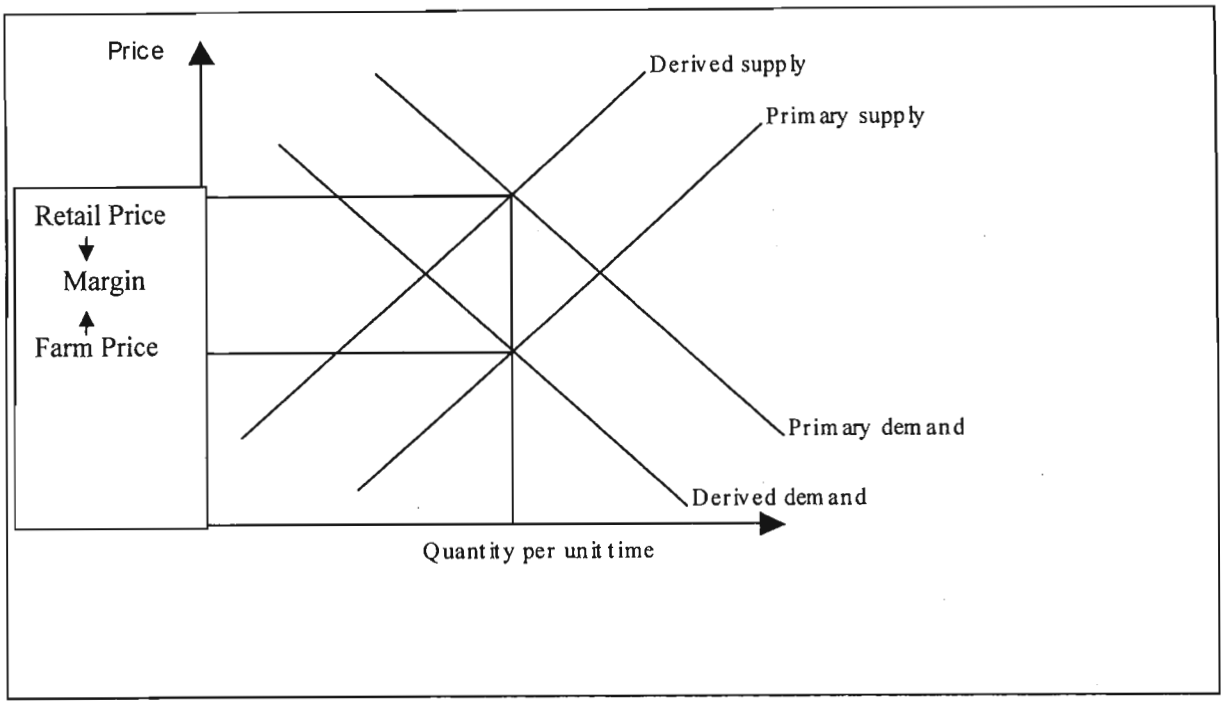


Figure 1.7: Primary and derived demand functions and marketing margins
Source: Tomek & Robinson (1993).

Primary supply refers to the relationships at the producer level, while derived supply at the retail level is derived from primary supply by adding an appropriate margin. Thus, the retail price occurs where the primary demand and the derived supply intersect, and the farm-level price is where the derived demand and primary supply intersect. The MM is the difference between the retail price and the farm-level price of an equivalent amount of the farm commodity. The MM needs to cover the costs of transferring the produce from one stage to the next, and provide a reasonable return to those performing the marketing services (transport activities, storage activities, wholesale trade and retail trade (Brorsen *et al.*, 1985)).

The MM can vary depending upon the nature of the supply function of marketing activities. If the supply function is positively sloped, the price (P_B) of marketing services increases as the

demand for such services increases, so that the MM will be higher the larger the quantity (Q) produced and marketed. Conversely, assuming economies of scale in providing marketing services, the supply function will be negatively-sloped implying that lower margins are expected with a larger Q. 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 unit costs of marketing may be a result of technological improvements (T) in the provision of such services. Thus, $MM = f(P_B, Q, T)$ (Tomek & Robinson, 2003).

Oligopsony (few buyers) power may result in larger MMs (Rogers & Sexton, 1994). Increasing concentration can lead to noncompetitive allocations of resources that result in higher prices for the final product than there would be under more competitive market situations. 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, and consumers may pay higher than competitive retail prices. Farmers in this instance may have to resort to forming a bargaining organization to counter the oligopsonist. However, there are social costs associated with the formation of such an association, for example, imperfect competition is promoted. Changes in MMs over short periods of time are largely caused by changes in the supplies of raw agricultural products or consumer demand, while longer-term changes mainly result from changes in the cost of labour 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 channel (Hahn, 2004).

Price risk is another factor that can influence the size of MMs. Risk is a cost to the risk-averse middleman such as a processor who may buy a farm commodity at a known current price but be uncertain about 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, with perishable products having 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 the EFO farmers are capable of performing these activities better.

A large MM or a falling farmer' share (retail price per unit minus MM for an equivalent amount of raw product at the farm level, expressed as a percentage of the retail price) are not necessarily indicative of 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 farmer's share of the consumer's organic crop rand may fall. This, however, could increase the net rand returns earned by producers even if farm gate price does not rise as more product volume is traded.

Note that MMs must be interpreted with care as they usually do not account for any volume effect of promotional price specials, and the quality definition for the farm commodity may not correspond exactly with the quality specification of the retail product (Tomek & Robinson, 2003). The MMs reported in this study estimate the distribution of the consumer's organic crop rand among the EFO farmers, the pack-house agent and the retailer in the formal

organic crop supply chain, and how this distribution changed during 2001-2004. This shows trends in the farmers' share and the middleman's share (MM as a percentage of the retail price) for the three organic crops (Nelson & Duewer, 1997). The next chapter discusses the research methodology used to analyze the EFO members' perceptions about their working relationship with the pack-house agent.

CHAPTER 2

RESEARCH METHODOLOGY USED TO ANALYZE EFO MEMBERS' PERCEPTIONS OF THE WORKING RELATIONSHIP WITH THE PACK-HOUSE AGENT

This chapter describes the data sources, a conceptual model of the formal organic crop supply chain working relationship, survey questionnaire and empirical models and statistical techniques that will be used in this part of the study.

2.1 Data sources

Primary data were collected from EFO farmers between October and December 2004 in the Umbumbulu district of KZN, SA. The EFO had 151 members from 127 households, and 48 members were fully certified organic farmers, at the time of the study. The first phase of the fieldwork consisted of preliminary interviews conducted in February 2004 with some EFO farmers, their executives and the pack-house agent regarding the number of certified farmers, the crops produced, the markets accessed and the type of supplier relationships. Most of the farmers interviewed indicated a need to improve the current working relationship with the pack-house agent and also spoke about a need to improve communication. The second phase of fieldwork during October-December 2004 involved working with a non-government organisation, LIMA, to administer a census survey questionnaire that elicited baseline information such as farm and household assets, household demographics, perceived problems in organic crop production and marketing, land tenure security and perceptions about aspects of their working relationship with the pack-house agent, for the 48 fully certified organic farmers.

2.2 Conceptual model of the formal organic crop supply chain working relationship

A conceptual model to analyse the 48 EFO farmers' perceived levels of satisfaction, trust, cooperation and commitment in their working relationship with the pack-house agent will be estimated using two separate recursive models of cooperative behaviour and a simultaneous-equation model: the first model is based on work by Anderson & Weitz (1991), Smith *et al.* (1995), Schroder *et al.* (2000), Hunt *et al.* (2002), and Claro *et al.* (2003), while the second model is the KMV model proposed by Morgan & Hunt (1994). These models are summarized in Figure 2.1 on page 38.

The first model postulates that high levels of satisfaction and trust are precursors for high levels of cooperation and, subsequently, human resource commitment in the supply chain. Causality thus runs from SATISFACTION→TRUST→COOPERATION→COMMITMENT. All parties in the working relationship have a stake in the outcome of cooperative behaviour to ensure ongoing commitment (Mentzer, 2001). The initiation of cooperation requires trust, and high levels of cooperative behaviour result in commitment. "Once trust is established, firms learn that coordinated, joint efforts will lead to outcomes that exceed what the firm would achieve if it acted solely in its own best interest" (Anderson & Narus, 1990: 45).

The KMV model suggests a different causality between the latter relationships, advocating that causality runs from SATISFACTION→TRUST→COMMITMENT→COOPERATION. This model supports Mould & Starr's (2000) contention that cooperative behaviour demands commitment of resources and sharing of proprietary information. Both models imply that the EFO farmers need to perceive high levels of satisfaction with their working relationship with the pack-house agent before they can develop trust in these relationships. Given the competing

views on the causality between cooperation and commitment, both models will be estimated separately and then combined into a simultaneous-equation model.

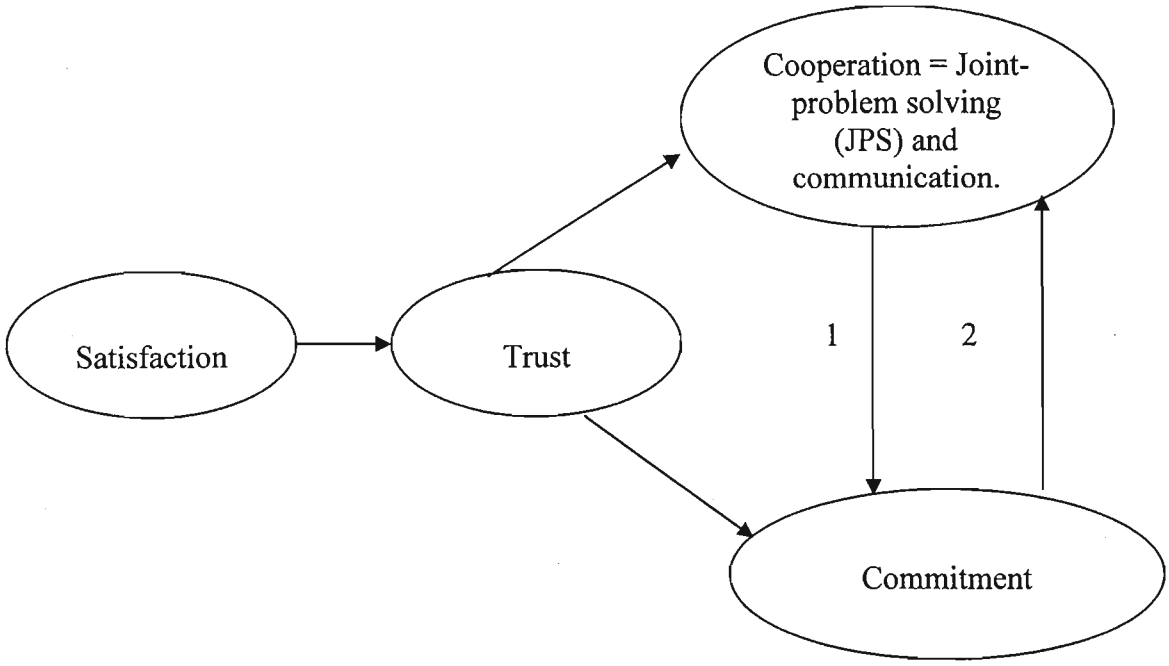


Figure 2.1: Recursive models of EFO formal supply chain relationships

1 → *Model adapted from Anderson & Weitz* (1991); *Hunt et al.*, (1995);*and Smith et al.* (1995).
2 → *KMV Model adapted from Morgan & Hunt* (1994).

The conceptual models of relationship satisfaction, trust, cooperation and commitment suggest the following study research hypotheses:

H_1: *The higher are the levels of satisfaction that the EFO farmers have with the working relationship with the pack-house agent, the higher are their levels of trust.*

H_2: *The higher are the levels of trust that the EFO farmers have in their working relationship with the pack-house agent, the greater will be their levels of cooperation, as shown by higher levels of joint-problem solving and communication.*

H_3: *The higher are the levels of trust that the EFO farmers have in their working relationship with the pack-house agent, the more human resources they will commit to this relationship.*

As a result of the competing views about the causality between cooperation and commitment, alternative hypotheses are:

H_4: *The higher are the levels of cooperation in their working relationship with the pack-house agent, the more committed the EFO farmers will be to the relationship.*

H_5: The *higher are the levels of commitment by the EFO farmers in their working relationship with the pack-house agent, the more cooperative they are likely to be in the relationship.*

During the census survey, the 48 fully certified organic EFO farmers were personally interviewed to obtain their perceptions about key aspects of their working relationship with the pack-house agent: (a) their overall satisfaction with this relationship; (b) the degree of trust, joint-problem solving, communication and commitment between them in the formal amadhumbes, sweet potatoes and potatoes supply chain; and (c) their levels of cooperation in the production planning, harvesting, scheduling, and marketing of the organic crops and quality control. Individual levels of satisfaction with the pack-house agent were assessed by asking each of these farmers the question: "How satisfied are you with your working relationship with the agent at the pack-house

over the last season". This question was ranked on a Likert-type scale from 4 (very satisfied) to 1 (very dissatisfied), and the farmers were given the option of giving the reason for their perception. Perceived levels of trust in the working relationship with the agent were measured using an index derived from their scores on Likert-type scales that showed how strongly they agreed with statements such as "We have a strong personal confidence in each other", "We have a strong business confidence in each other", "We can always rely on each other when it counts", "This agent will work hard in the future to maintain a close relationship with EFO", "I am very confident that this relationship will continue in future", "This agent is trustworthy" and "This agent has always been fair in his negotiations with us" (see Appendix 1 on page 109). Respondents were asked to rate the statements on a scale from 1 (strongly disagree) to 4 (strongly agree). An index of the level of trust perceived by each producer was then estimated by taking his/her average score over all the relevant statements that relate to the aspects of trust in a business relationship. For example, for the above seven statements, if a grower scores 2,2,1,4,3,1 and 1, he/she scores a 2 on the level of trust index ([2+2+1+4+3+1+1]/7). Index values that are close to 4 show relatively high levels of trust, while values closer to one suggest low levels of trust in the working relationship.

Individual grower's perceived levels of cooperation and commitment in the working relationship with the pack-house agent were similarly estimated by averaging their respective Likert-type scores (see also Appendix 1) for indicators of each of these behaviours. High scores for cooperation (joint-problem solving and communication) reflect strong agreement with the following statements "We often discuss issues such as changes in customers' needs for organic products", "We have extensive formal and informal communications", "We discuss only need to know information that relates directly to our relationship", and "We make joint decisions about: reducing costs in the pack-house, organic product delivery scheduling, organic product quality

control, improving organic product quality and new organic products to grow". Similarly, high commitment scores imply that growers strongly agreed with statements such as "We devote considerable time trying to improve this relationship", "We have made major changes in our delivery schedule in order to deal more effectively with the pack-house", "We devote considerable time to improve pack-house productivity" and "We work together to achieve productivity gains from which we both benefit".

2.3 Empirical recursive and simultaneous-equation models

An empirical recursive model (see Gujarati (2003) and Koutsoyiannis (1987) for model properties) will first be used to test hypotheses H_1, H_2 and H_4, assuming that causality runs from SATISFACTION→TRUST→COOPERATION→COMMITMENT. These hypotheses give the following equations, where the signs on the β coefficients indicate the expected direction of the relationship between the dependent and explanatory variables:

$$\text{Trust} = \beta_1 + \beta_2\text{Satisfaction} + \mu_1 \tag{2.1}$$

$$\text{Cooperation} = \beta_3 + \beta_4\text{Trust} + \mu_2 \tag{2.2}$$

$$\text{Commitment} = \beta_5 + \beta_6\text{Cooperation} + \mu_3. \tag{2.3}$$

where μ_1, μ_2 and μ_3 are the error terms.

A second recursive model will then be estimated to test hypotheses H_3 and H_5 in the KMV model SATISFACTION→TRUST→COMMITMENT→COOPERATION, in the following equations:

$$\text{Trust} = \beta_1 + \beta_2\text{Satisfaction} + \mu_1 \quad (2.1)$$

$$\text{Commitment} = \beta_7 + \beta_8\text{Trust} + \mu_4 \quad (2.4)$$

$$\text{Cooperation} = \beta_9 + \beta_{10}\text{Commitment} + \mu_5 \quad (2.5)$$

where μ_4 and μ_5 are the error terms.

Note that the first equation in the KMV model is the same as equation (2.1) in the first model. In both models the recursive equations will be estimated in two forms, firstly using Ordinary Least Squares (OLS) assuming that the errors terms are not correlated with the explanatory variables (see Gujarati, 2003) and secondly using the method of instrumental variables to remedy possible violation of this assumption (see Koutsoyiannis, 1987).

The simultaneous-equation model combining the two recursive models in equations (2.1) through to (2.5) requires more explanatory variables in order to identify the individual equations (provide sufficient information to estimate the coefficients (Gujarati, 2003)). Variables representing the costs of maintaining the supply chain relationship, and price uncertainty, will thus be added to give the following simultaneous-equation model:

$$\text{Trust} = \beta_1 + \beta_2\text{Satisfaction} + \mu_1 \quad (2.1)$$

$$\text{Cooperation} = \beta_{11} + \beta_{12}\text{Trust} + \beta_{13}\text{Commitment} - \beta_{14}\text{RCOSTS} + \mu_6 \quad (2.6)$$

$$\text{Commitment} = \beta_{15} + \beta_{16}\text{Trust} + \beta_{17}\text{Cooperation} - \beta_{18}\text{PUNC} + \mu_7 \quad (2.7)$$

where RCOSTS = Relationship maintenance costs; PUNC = Price uncertainty, and μ_6 and μ_7 are error terms. Note again that the first equation in this model is the same as the first equation in the two recursive models.

The RCOSTS variable in equation (2.6) reflects the extent to which the 48 fully certified organic EFO farmers would have perceived costs such as "Membership fees", "Time attending meetings", "More work effort in crop production", and "Increased expenditure on hired labour and other farm inputs" as ranging from 1 (none) to 4 (excessive) on a Likert-type scale (see Appendix 2 on page 111). Adapting research by Rozemeijer *et al.* (2003), these costs can be interpreted as barriers that negatively affect the desire to cooperate across players in the supply chain. The PUNC variable in equation (2.7) shows the growers' perceived level of uncertainty about the price that they would receive for their organic crops from the pack-house on a Likert-type scale ranging from 1 (no problem) to 3 (severe problem). Following Morgan & Hunt (1994:25), supply chain partners that expect positive relationship benefits from their partnership – relative to other benefits – on such dimensions as product profitability, will be relatively more committed to the working relationship. Price uncertainty will create uncertainty about expected profits, and, hence, uncertainty about the EFO farmers' expected relationship benefits. The inclusion of RCOSTS and PUNC thus generates two further study research hypotheses:

H_6: *The higher are the perceived levels of relationship maintenance costs that EFO farmers must incur to participate in the formal organic crop supply chain, the lower will be their levels of cooperation.*

H_7: *The higher are the EFO farmers' perceived levels of relative price uncertainty, the lower will be their levels of commitment to the formal organic crop supply chain.*

The 48 EFO farmers' perceived levels of satisfaction, trust, cooperation (JPS and communication) and commitment are represented by their estimated index scores for these concepts derived from the Likert-type scales. Applying the underlying theory, it is expected that the overall level of satisfaction and trust would be positively related, and that both cooperative behaviour (JPS and communication) and commitment would be positively related to trust. This implies that higher degrees of satisfaction, and hence higher levels of trust, between EFO farmers and the pack-house agent, are the antecedents for greater cooperation and commitment. A positive relationship between commitment and cooperation is also expected. Finally, higher costs of maintaining the relationships are likely to lead to less cooperative behaviour by the farmers, while higher levels of relative price uncertainty may result in less commitment by the farmers to the working relationship. The next chapter presents the empirical results of estimating the recursive and simultaneous-equation models described in this section. Before doing this, it describes the socio-economic characteristics of the 48 study farmers, and correlations between the farmers' scores for the key variables affecting the working relationship.

CHAPTER 3

EMPIRICAL ANALYSIS OF THE WORKING RELATIONSHIP IN THE FORMAL ORGANIC CROP SUPPLY CHAIN

This chapter first discusses the socio-economic characteristics of the 48 fully certified organic EFO farmers, correlations between the different aspects of the working relationship used in this study, and the farmers' scores for perceived levels of trust, cooperation and human resource commitment. It then compares the estimated recursive models and the simultaneous-equation model, and discusses the farmers' perceptions about their levels of cooperation with the pack-house agent in organic crop production and marketing activities.

3.1 Socio-economic characteristics of the 48 fully certified organic EFO farmers

Table 3.1 overleaf summarizes the mean values of the socio-economic characteristics of the 48 fully certified organic EFO farmers. On average, the farmers tend to be relatively old (mean age = 53 years), and most are women (80%). The average family size is relatively large (about 9 members), and these farmers have relatively low levels of education (average schooling of 4.9 years). The proportion of annual cash income for these households from farming is about 33%, implying that most of the 48 EFO farmers have other sources of income. Farm income is probably constrained in part by risks like drought and variable crop prices, and a lack of market information. The 48 fully certified farmers on average do not use all of their arable crop land to plant organic crops - only about 48% on average of their arable crop land is planted to organics and the remainder is either left fallow or rented out to other organic crop farmers. Land rental transactions are informal arrangements in order to avoid the

risk of losing access to (communally-owned) land if the chief perceives that the rented land is 'surplus' to the household requirements.

Table 3.1 Socio-economic characteristics of the 48 fully certified organic EFO farmers, KwaZulu-Natal, 2004

Characteristic	Mean	SE[a]
Age (years)	53	2.045
Proportion of women (%)	80	------
Household size (numbers)	9	0.711
Education (years in school)	5	0.603
Proportion of income from organic farming (%)	33	0.039
Proportion of accessible arable land planted to organic crops (%)	48	0.110

Note: [a]*SE = standard error of the mean.*

3.2 Correlations between the 48 fully certified organic EFO farmers' scores for key aspects of their working relationship with the pack-house agent

The correlation matrix for the aspects of the working relationship in the formal organic supply chain is shown in Table 3.2 on page 47. The estimated correlation coefficients show that there is a relatively strong positive association among the relationship aspects of satisfaction, trust, cooperation and commitment, and that these correlations are highly statistically significant at the 1% level of significance. The aspects of relationship maintenance costs (RCOSTS) and price uncertainty (PUNC) are negatively correlated with satisfaction, trust, cooperation and commitment. The negative correlation between RCOSTS and cooperation is statistically significant at the 5% level, while the negative correlations between PUNC and commitment and PUNC and satisfaction are both statistically significant at the 1% level. These results suggest that satisfaction, trust, cooperation and commitment are complementary relationships,

while perceived high relative price uncertainty and relationship maintenance costs reduce the level of these relationships.

Table 3.2 Correlation coefficients between the aspects of the working relationship for the 48 fully certified organic EFO farmers and the pack-house agent, KwaZulu-Natal, 2004

	Satisfaction	Trust	Cooperation	Commitment	RCOSTS	PUNC
Satisfaction	1					
Trust	0.621**	1				
Cooperation	0.585**	0.593**	1			
Commitment	0.633**	0.552**	0.696**	1		
RCOSTS	-0.142	-0.241	-0.305**	-0.099	1	
PUNC	-0.391**	-0.222	-0.247	-0.386**	-0.181	1

Note: ** *Denotes statistically significant at the 1% level (2-tailed).*
* *Denotes statistically significant at the 5% level (2-tailed).*
RCOSTS = relationship maintenance costs, and PUNC = price uncertainty.

3.3 Index scores for the 48 fully certified organic EFO farmers' perceived levels of satisfaction, trust, cooperation and human resource commitment

The mean, minimum and maximum index scores showing the 48 EFO farmers' perceived levels of satisfaction, trust, cooperation (joint-problem solving and communication) and human resource commitment in their working relationship with the pack-house agent are reported in Table 3.3 on page 48. Scores for these EFO farmer-agent links ranged from a minimum of 1 for satisfaction, trust and communication, to a maximum of 4 for the same aspects of the working relationship. Joint-problem solving raged from a minimum of 2 to a maximum of 3.80 and commitment from a minimum of 1.5 to a maximum of 3.75. Mean scores close to 3.00 for all four aspects of the working relationship suggest that these 48 EFO producers, on average, perceived relatively high levels of satisfaction, trust, joint-problem

solving and communication in their relationship with the packer, and that they are fairly strongly committed to this relationship. About 27% of these farmers perceived relatively low levels of satisfaction, 21% low levels of trust, 33% low levels of communication, 8% low levels of joint-problem solving, and 46% low levels of commitment. These results suggest that there is scope to improve commitment by these farmers to the working relationship by further strengthening communication and joint-problem solving, and working towards building more satisfaction and trust.

Table 3.3 The 48 fully certified organic EFO farmers' scores for their perceived levels of satisfaction, trust, joint-problem solving, communication and commitment in the working relationship with the pack-house agent, KwaZulu-Natal, 2004

Aspect of Relationship	Minimum[a] Index Score	Maximum Index Score	Mean Score	SE[b]
Satisfaction	1.00	4.00	2.787	0.091
Trust	1.00	4.00	2.76	0.076
Communication	1.00	4.00	2.73	0.065
Joint-problem solving	2.00	3.80	2.88	0.045
Commitment	1.50	3.75	2.66	0.060

Note: [a] *Scores range from 1 (strongly disagree) to 4 (strongly agree), and show to what extent these farmers agree or disagree with statements about aspects of their working relationship with the packer. Scores closer to 1 suggest weak aspects of the relationship, while scores near 4 indicate strong aspects.*
[b] *SE: Standard error of the mean.*

3.4 Recursive models

The three equations estimated by Ordinary Least Squares (OLS) regression for the first recursive model, assuming that the error terms are uncorrelated with the endogenous explanatory variables (Gujarati, 2003: 764), using the SPSS statistical package (Norusis, 1994) were (estimated t statistics in parentheses and df = degrees of freedom):

$$\text{Trust} = 1.278 + 0.531\text{Satisfaction} \qquad (3.1)$$
$$(5.316)^{***}$$

Adjusted $R^2 = 0.37$ $F = 28.26^{***}$ $df = 47$

$$\text{Cooperation} = -3.315 + 1.200\text{Trust} \qquad (3.2)$$
$$(5.556)^{***}$$

Adjusted $R^2 = 0.39$ $F = 30.87^{***}$ $df = 47$

$$\text{Commitment} = 2.661 + 0.271\text{Cooperation} \qquad (3.3)$$
$$(5.800)^{***}$$

Adjusted $R^2 = 0.41$ $F = 33.64^{***}$ $df = 47$

The triple asterisk *** indicates statistically significant coefficient estimates at the 1% level of significance for all equations. In equation (3.1), higher levels of perceived overall satisfaction with the working relationship lead to higher levels of trust. Equation (3.1) is statistically

significant (F=28.26), and variance in satisfaction explains about 37% of the variance in trust. In equation (3.2), higher levels of trust, in turn, encourage more cooperation by the EFO members in the organic crop supply chain activities. Equation (3.2) is statistically significant (F=30.87), and the variance in trust explains 39% of the variance in cooperation. Equation (3.3) indicates that the level of cooperation has a positive impact on the level of commitment. This equation is also statistically significant (F=33.64), and variance in cooperation accounts for 41% of the variance in commitment. These results support hypotheses H_1, H_2 and H_4 that were proposed in section 2.2 of Chapter 2.

The first recursive model was re-estimated by *the Method of Instrumental Variables* (Koutsoyiannis, 1987: 376) to allow for the error terms being correlated with the endogenous explanatory variables. The original Trust variable in equation (3.2) was replaced by the instrumental variable (TrustIV) that was estimated from equation (3.1), and the original Cooperation variable in equation (3.3) was replaced by the instrumental variable CooperationIV that was estimated by regressing Cooperation on Satisfaction (the exogenous variable in the recursive model). The estimated model equations using the SPSS statistical package (Norusis, 1994) were (estimated t statistics in parentheses):

$$\text{Trust} = 1.278 + 0.531\text{Satisfaction} \qquad (3.1)$$

$$(5.316)^{***}$$

$$\text{Adjusted } R^2 = 0.37 \quad F = 28.26^{***} \quad df = 47$$

$$\text{Cooperation} = -5.057 + 1.839\text{Trust IV} \qquad (3.4)$$

$$(5.130)^{***}$$

Adjusted $R^2 = 0.36$ $F = 26.32^{***}$ $df = 47$

$$\text{Commitment} = 2.657 + 0.438\text{Cooperation IV} \quad (3.5)$$
$$(5.491)^{***}$$

Adjusted $R^2 = 0.40$ $F = 30.15^{***}$ $df = 47$

Equations (3.4) and (3.5) are both statistically significant (F=26.32 and 30.15, respectively). Variance in TrustIV explains 36% of the variance in cooperation, while variance in CooperationIV accounts for 40% of the variance in commitment. The positive, statistically significant coefficient estimates in all three equations again support hypotheses H_1, H_2 and H_4 in section 2.2 of chapter 2, although the adjusted R^2 and F statistics are marginally lower using the instrumental variables. The three equations estimated by OLS regression for the KMV recursive model, assuming that the error terms are uncorrelated with the endogenous explanatory variables (Gujarati, 2003: 764), using the SPSS statistical package (Norusis, 1994) were (estimated t statistics in parentheses):

$$\text{Trust} = 1.278 + 0.531\text{Satisfaction} \quad (3.1)$$
$$(5.316)^{***}$$

Adjusted $R^2 = 0.37$ $F = 28.26^{***}$ $df = 47$

$$\text{Commitment} = 1.465 + 0.437\text{Trust} \quad (3.6)$$
$$(4.492)^{***}$$

Adjusted $R^2 = 0.29$ $F = 20.18^{***}$ $df = 47$

$$\text{Cooperation} = -4.145 + 1.557\text{Commitment} \qquad (3.7)$$
$$(5.800)^{***}$$

Adjusted $R^2 = 0.41$ $F = 33.64^{***}$ $df = 47$

The triple asterisk *** indicates statistically significant coefficient estimates at the 1% level of significance for all equations. Equations (3.6) and (3.7) show that trust and commitment are key antecedents for cooperative behaviour. Both equations are statistically significant (F=20.18 and 33.64, respectively). Variance in trust explains 29% of the variance in commitment, while variance in commitment accounts for 41% of the variance in cooperation. These results support hypotheses H_1, H_3 and H_5 in section 2.2 of Chapter 2.

The KMV recursive model was also re-estimated using instrumental variables to again allow for possible violation of the assumption that the error terms were uncorrelated with the endogenous explanatory variables. The original Trust variable in equation (3.6) was replaced by the instrumental variable (TrustIV) that was estimated from equation (3.1), and the original Commitment variable in equation (3.7) was replaced by the instrumental variable CommitmentIV that was estimated by regressing Commitment on Satisfaction (the exogenous variable in the recursive model). The estimated model equations using the SPSS statistical package (Norusis, 1994) were (estimated t statistics in parentheses):

Trust = 1.278 + 0.531Satisfaction (3.1)

(5.316)***

Adjusted $R^2 = 0.37$ F = 28.26*** df = 47

Commitment = 0.443 + 0.805TrustIV (3.8)

(5.491)***

Adjusted $R^2 = 0.40$ F = 30.15*** df = 47

Cooperation = -6.069 + 2.284CommitmentIV (3.9)

(5.130)***

Adjusted $R^2 = 0.37$ F = 26.32*** df = 47

Equations (3.8) and (3.9) are statistically significant (F=30.15 and 26.32, respectively). Variance in TrustIV explains 40% of the variance in commitment, while variance in CommitmentIV accounts for 37% of the variance in cooperation. The positive, statistically significant coefficient estimates in all three equations again support hypotheses H_1, H_3 and H_5 in section 2.2 of Chapter 2.

3.5 Simultaneous-equation model

Equations (2.1), (2.6) and (2.7) in chapter 2 were all identified, but multicollinearity was detected in equations (2.6) and (2.7) at Stage 2 when Two-stage Least Squares (2SLS) (Gujarati, 2003) was initially used to estimate the simultaneous-equation model. The

instrumental variable (IV) for the endogenous explanatory variable Trust in Stage 2 was statistically significantly correlated with the IVs for the endogenous explanatory variables Cooperation and Commitment, and with RCOSTS and PUNC, and all variance-inflation factors (VIFs) were greater than 10 (Gujarati, 2003). Principal Component Analysis (PCA) was, therefore, used in Stage 2 to try and remedy this problem (Manly, 2005; Darroch, 2005; Jones, 1985). This technique generates principal components (PCs) that resemble the original variables but are uncorrelated and account for the variation in the original variables in descending order (Manly, 2005). The method of PCA assumes that the underlying data are interval data that are multivariate normally distributed. Although this assumption is violated by using ordinal variables such as Likert-type scores in Stage 2, the use of PCA is still justified as the correlation coefficients between the variables are all below 0.7 (Kim & Mueller, 1978). Applying PCA produced three PCs for both equation (2.6) and equation (2.7). The first and second PCs accounted for 99% of the variance in the three variables in both equations, and so multicollinearity was remedied in each equation by using two PCs and estimating the final simultaneous-equation model by 2SLS using the SPSS statistical package (Norusis, 1994) and considerable guidance from Darroch (2005) (estimated t statistics in parentheses) as:

$$\text{Trust} = 1.278 + 0.531\text{Satisfaction} \qquad (3.1)$$

$$(5.316)^{***}$$

Adjusted $R^2 = 0.37$ $F = 28.26^{***}$ $df = 47$

$$\text{Cooperation} = 2.813 + 0.187PC_1 - 0.075PC_2 \qquad (3.10)$$

$$(5.005)^{***} \quad (-2.010)^{**}$$

where $PC_1 = 0.963\text{TrustIV} + 0.993\text{CommitmentIV} - 0.127\text{RCOSTS}$

and PC_2 = -0.257TrustIV – 0.025CommitmentIV + 0.992RCOSTS

Adjusted R^2 = 0.37 F = 14.58** df = 46

Commitment = 2.665 + 0.244PC_3 - 0.118PC_4 (3.11)

(5.007)*** (-2.432)**

where PC_3 = 0.984TrustIV + 0.975CooperationIV - 0.185PUNC

and PC_4 = -0.173TrustIV – 0.196CooperationIV + 0.983PUNC

Adjusted R^2 = 0.39 F = 15.49** df = 46

The triple asterisk *** and the double asterisk ** indicate statistically significant coefficient estimates at the 1% and 5% levels of significance, respectively, for all equations. TrustIV, CommitmentIV and CooperationIV denote instrumental variables for trust, commitment and cooperation, respectively. The EFO members that have higher levels of overall satisfaction with the pack-house agent have higher levels of trust in the working relationship (equation (3.1)). Variance in trust explains about 37% of the variance in overall satisfaction, and equation (3.1) is highly statistically significant (F=28.26). The estimated component and regression coefficients for PC_1 and PC_2 in equation (3.10) have the correct signs. High loadings above 0.900 for the instrumental variables TrustIV and CommitmentIV in PC_1 imply that EFO members who perceive higher levels of trust also tend to have higher levels of commitment, which together via the positive coefficient estimate for PC_1 lead to higher levels of cooperation. The high loading on RCOSTS in PC_2 contrasts higher levels of relationship maintenance costs with lower levels of trust, and the negative coefficient estimate for PC_2 indicates that levels of cooperation fall as these costs rise. Variance in PC_1 and PC_2 explains

37% of the variance in cooperation, and equation (3.10) is highly statistically significant (F=14.58).

In equation (3.11), the estimated component loadings and regression coefficients for PC_3 and PC_4 again agree with *a priori* reasoning. Higher levels of trust associated with higher levels of cooperation shown in PC_3 lead to higher levels of commitment to the working relationship, while higher levels of price uncertainty in PC_4 cause lower levels of commitment. Variance in PC_3 and PC_4 accounts for 39% of the variance in commitment, and equation (3.11) is highly statistically significant (F=15.49). The estimated equations thus support hypotheses H_1 to H_5 in section 2.2, and H_6 and H_7 in section 2.3, of Chapter 2. Higher levels of satisfaction lead to higher levels of trust that, in turn, promote cooperation and commitment by EFO members in the formal organic crop supply chain. Higher perceived costs of maintaining the working relationship and more price uncertainty, respectively, reduce levels of cooperation and commitment. There is also some evidence of a two-way, or simultaneous, relationship between cooperation and commitment.

3.6 Cooperation in organic crop production and marketing activities

In Table 3.4 overleaf, the EFO farmers view cooperation with the pack-house agent as "relatively high" in organic crop marketing and crop quality control, "moderate" in production planning and harvest scheduling, and "low" to "moderate" in the planning of new products to grow and market. The latter result may reflect the farmers' concerns about a new variety of sugar beans that they had recently planted but was not purchased by the pack-house agent. Production planning, harvest scheduling and new product planning thus seem to be the activities where more cooperation is needed.

Table 3.4 The 48 fully certified organic EFO farmers' scores for their perceived levels of cooperation with the pack-house agent in key production and marketing activities in the formal organic crop supply chain, KwaZulu-Natal, 2004

Activity	Minimum[a] score index	Maximum score index	Mean score index	SE[b]
Crop production planning	1	5	3.10	0.161
Crop harvest scheduling	1	5	3.29	0.149
Crop marketing	1	5	3.85	0.123
Crop quality control	1	5	3.74	0.127
Planning t o p roduce new products	1	5	2.53	0.136

Note: [a] *Scores were based on these farmers' perceptions of the level of cooperation for each production and marketing activity in the formal organic crop supply chain, and could range from 1 (very low cooperation) to 5 (very high cooperation).*
[b] *SE: Standard error of the mean.*

3.7 Discussion and conclusion

Results show that if the 48 fully-certified organic EFO farmers have higher levels of overall satisfaction in their working relationship with the pack-house agent, they will have higher levels of trust. Higher levels of trust, in turn, are a key antecedent for both more cooperative behaviour and more commitment to the supply chain relationship. There is also evidence that cooperative behaviour and commitment can influence each other positively, supporting the concept of simultaneous-equation modelling of these aspects of the working relationship. The 48 farmers' levels of cooperation will also tend to fall as the perceived costs of maintaining the supply chain relationship increase. Finally, these farmers would tend to commit more human resources to the

working relationship when they perceive less price uncertainty for the organic crop products that they sell through the pack-house.

Satisfaction, and hence more trust, in the formal organic supply chain working relationship could be built if the pack-house agent and the EFO farmers work together to develop resources, opportunities and benefits (e.g., price premiums) that are superior to the offerings of alternative partners. For example, the 48 respondents identified more reliable transport to the pack-house and co-investment in better crop storage facilities at farm-level as potential ways to improve crop quality, prices and net returns. Currently there is no empowerment label for EFO organic products sold by the major nationwide supermarket chain at the retail link. This label could earn price premiums for the EFO farmers via brand loyalty from higher-income consumers that are willing and able to pay relatively more for such a product, but further research is needed to establish if the expected costs of developing the label would be less than the expected price premiums. The 48 EFO farmers overall expressed moderate satisfaction with the working relationship with the pack-house agent during the survey, but price uncertainty for products sold tends to reduce their commitment to the working relationship. Continuous and open communication to share information between and among supply chain partners can help to reduce such uncertainty (Kwon & Suh, 2005). This may enable the EFO farmers to better plan which crop combinations to grow and what areas to allocate to each crop. Communication, which is a component of cooperation, could be improved between the retailer and the pack-house agent so that the agent can communicate better with the EFO farmers about crop production schedules and market quality expectations, and evaluations of the farmers' crop deliveries.

There is also an opportunity to increase satisfaction and hence trust, cooperation and commitment, by adopting a more formal written contract between the EFO farmers and the pack-

house agent. This contract should probably also be written in IsiZulu to accommodate the EFO farmers who have low levels of literacy (mean years of schooling per farmer is about 5 years). However, it is not possible to specify all possible contingencies, but according to Hart & Moore (1988), parties may make up for this "contract incompleteness" by building into the contract mechanisms for revising the terms of trade, as each player receives information about costs and benefits. Some of the matters that may be addressed in a formal contract as identified by EFO farmers relate to: what happens to the overall excess or under-supply of crops by EFO farmers; renegotiation of trading terms so that farmers may benefit from positive movements in organic crop prices; when title, value and risks associated with ownership pass to the buyer; handling procedures for rejected produce and the pricing mechanism to be used thereafter for that produce; procedures for paying farmers; mechanisms for tracing crop quality to individual farmers; and, finally, penalties for breaching the contractual arrangements.

Preis (2003) recommended that performance evaluation systems be kept as objective as possible and that all parties share purchasing decision criteria in a supply chain. In this case, these comments apply to the pack-house agent better informing EFO farmers about organic crop quality standards and why their crop deliveries are sometimes rejected. Improved information flows between the EFO farmers and the pack-house agent through education, technology development, and extension could also enhance commitment to the working relationship. To offset the relationship maintenance (transaction) costs, the EFO farmers could try to negotiate higher premiums for the organic crops sold through the pack-house. The EFO farmers may also consider developing new formal markets in which consumers are prepared to pay a premium for crop products that meet organic quality standards.

Finally, there is some scope for improving cooperation between EFO farmers and the pack-house agent in organic crop production planning, and planning to produce new varieties. This will increase the likelihood that organic crops are produced and harvested on schedule for the retailer. Actions that reduce overall satisfaction, trust, cooperation and commitment reduce the competitiveness of the study organic crop supply chain. Lessons learnt from the study could be adapted to help to improve the performance of, and/or develop new, organic crop supply chains for smallholders in other provinces in SA, and in other countries in Southern Africa. The next chapter describes the 48 farmers' perceptions of factors that constrain the competitiveness of the formal organic crop supply chain.

CHAPTER 4

EFO FARMERS' PERCEPTIONS OF FACTORS THAT CONSTRAIN THE COMPETITIVENESS OF THE FORMAL ORGANIC CROP SUPPLY CHAIN IN KWAZULU-NATAL

This chapter outlines how the EFO farmers' perceptions of constraints on the formal organic crop supply chain competitiveness were elicited, their ranking of these constraints, and the method of PCA (Manly, 2005) that was used to identify further 'dimensions' in these perceptions. If the supply chain players work together to overcome these farming constraints, they could improve their profit margins. Based on the studies reviewed in section 1.4.9, the plausible research hypothesis underlying this analysis is:

H_8: *Identifying and communicating the key constraints that limit the competitiveness of the 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.*

4.1 Methodology

The 48 fully certified organic EFO farmers were asked in the census survey to give their perceptions of the main constraints that limit the competitiveness of the KZN formal organic crop supply chain by ranking the set of 20 potential constraints listed in Appendix 3 on page 112 on Likert-type scales ranging from 1 (no problem) to 3 (severe problem). These constraints were developed from the literature review in section 1.4.9., past research on the sources of risk in agriculture, challenges that smallholder farmers face in trying to access

formal supply chains, interviews with experts in small farmer crop practices in the EFO area, the current drivers of change in SA agriculture, and the author's observations made during site visits to the EFO area (Sonka & Patrick, 1984; DGTZ, 2000; Darroch, 2001; Hardman *et al.,* 2002; Modi, 2004; Pringle, 2004; Khan, 2005). The EFO growers were also requested to score any other constraint(s) that they wanted to add to the list of hypothesized constraints. These constraints are ranked in section 4.2 from most important to least important ones. The ranking was done by averaging the scores on each constraint and then arranging them in descending order.

The method of PCA was then applied to these scores to analyse *further underlying dimensions* of the variation among these constraints. It aims to economize on the number of variables and to summarize the information contained in a number of correlated variables (in this case the 20 constraints) into a smaller set of uncorrelated dimensions with minimal loss of information (Manly, 2005). The decision about which PCs to retain depends on the percentage of the variance accounted for the variable, the absolute variance accounted for by each PC, and whether the PC can be *meaningfully interpreted.* The PCs were estimated as linear functions of the original 20 constraints as:

$$PC_i = a_{i1}X_1 + a_{i2}X_2 + \ldots + a_{i20}X_{20} \qquad (2.8)$$

where i = 1 … 20; a_{i1} … a_{i20} = the component loadings; and X_1 … X_{20} = the 20 constraints listed in Appendix 3. The coefficients $a_{i1}, a_{i2}, \ldots, a_{i20}$ were chosen such that the first PC (PC_1) will have as large a variance as possible, the second PC (PC_2) was chosen to be uncorrelated with the first, and to have as large variance as possible, etc. The PCs thus provide measures of the amount of common variation as well as magnitudes and nature of divergences in the

EFO farmers' scores for their perceptions of organic farming constraints. The PCs (PC_1.... PC_{20}) can be most informative since weights are assigned in a way that captures the maximum variance of the 20 variates, thus making it possible to calculate useful indexes from the EFO farmers' scores if the PCs can be meaningfully interpreted (Koutsoyiannis, 1987). Note that the assumption of PCA is that interval data that are multivariate normally distributed be used, but Kim & Mueller (1978) justify the use of ordinal data like Likert-type scales under two conditions: firstly, if the PCA is used to find general clusterings of variables for exploratory purposes (as is the case in this study), and, secondly, if the underlying correlations among variables are believed to be moderate – say less than 0.6 or 0.7. The PCs in this study are estimated using the covariance matrix as the 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 relative variance (Manly, 2005).

Results of the PCA showing the main underlying 'dimensions' in the constraint scores given by the 48 fully certified organic EFO farmers are given in section 4.3. The next section presents the farmers' rankings of these perceived constraints.

4.2 The 48 EFO farmers' perceived constraints on organic crop farming

The EFO farmers' rankings of the key constraints that limit the competitiveness of the formal organic crop value chain in KZN are shown in descending order in Table 4.1 on page 65 and identify further aspects that they need to communicate about, commit resources to, and jointly solve. Uncertain climate, unavailability of tractor or draught power when needed, delays in payments for crops sent to the pack-house, inputs not available at affordable prices, a lack of cash and credit to finance inputs, lack of affordable transport to market crops, more work than

the family can handle, a lack of manure to purchase, and a lack of crop storage facilities and telephones to negotiate sales, were perceived as the top ten constraints they currently face. Climatic conditions are beyond the farmers' control, and the top ranking probably reflects the farmers' concerns about the effects of recent drought in the Umbumbulu district. The estimated standard error of the mean score (SE) for the uncertain climate constraint was the lowest (0.02), indicating that the farmers tended to similarly score this constraint. There also tended to be relatively less deviation about the mean score in their rankings for delays in payments for crops sent to the pack-house, and unavailability of tractor or draught power when needed and inputs not available at affordable prices (SE = 0.05 for all these constraints). There tended to be 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).

The retailer was asked to indicate and rate the severity of each of the constraints as reported in Table 4.2 on page 67. The retailer indicated high transport costs, supplier's inflexibility, low shelf life (perishability), failure by EFO farmers to meet quality standards, sometimes lower economic rewards of organic foods compared to conventional foods, lack of information and marketing of organics as the perceived top seven constraints limiting the formal organic crop supply chain competitiveness. The EFO farmers' failure, at times, to meet organic quality standards seems to be a concern, considering that farmers also cite the pack-house agent sometimes rejecting their crops as a concern. The implication is that product quality is critical to maintaining the competitiveness of the organic crop supply chain. Consumers identify organic foods as being "more natural" in the way that they are produced such that relatively low quality organic food may not be marketable, nor command a premium price.

Table 4.1 The 48 fully certified organic EFO farmers' rankings of the key constraints on the competitiveness of the formal organic crop supply chain, KwaZulu-Natal, 2004

Constraint	Mean	SE[a]	Ranking	Constraint	Mean	SE	Ranking
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[1]	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	19

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

[a] *SE = standard error of the mean.*

The retailer also raised the following issues: First, organic farming can be very risky for farmers, for instance, dealing with pests without using synthetic pesticides or whether the method applied will really control pests. The retailer felt the government needed to subsidise organic farmers to transfer part of the perceived risk. Secondly, organics have a relatively short shelf-life since they are not treated with chemicals and, the retailer estimated a loss of 400 out of every 1000 volume of organic foods. After reaching the specified shelf-life, the organic foods are removed from the shelves and sold to the staff at a discount. The remainder is usually donated to charity. Finally, smaller retail stores do not stock organic foods due to these anticipated losses, which could reduce their expected overall returns (Khan, 2005).

The marketing of organic foods seem to be a major constraint especially if it is coupled with lack of knowledge regarding consumers' attitudes and preferences toward organic foods. Giannakas (2002) supports this point by arguing that information asymmetry with regard to organic foods can limit the competitiveness of the organic food industry. He argues that in the absence of information regarding the nature of the product, conventional and organic products are marketed together and the price received by both producers is the same, despite the costs of production incurred. From Table 4.2, uncertain demand for organic foods is not a problem, implying that the market for organic foods is available. The KZN formal organic crop supply chain players need to integrate their production activities and work together on these constraints to take advantage of the market opportunities. To support this argument, Wong *et al.* (2005) argue that organisations working cooperatively with partners can reduce the complexity of their environment and gain more control over the environmental factors. Note that the pack-house agent's perceptions of main constraints that limit the competitiveness of the formal organic crop chain in KZN are not presented or discussed in this study because the agent regarded this information as confidential.

Table 4.2 The retailer's scores for the perceived constraints that limit the competitiveness of the formal organic crop supply chain, KwaZulu-Natal, 2004

Constraint	Score
Uncertainty of organic supply	1
Uncertain demand of organics	1
Lack of credit to finance EFO	1
Limited market for organics	2
High transport costs	3
Customer complaint about organic premiums	2
Lack of consumer knowledge	1
Suppliers' flexibility	3
Perishability of organic produce	3
Quality of produce	2
Uncertain future demand for organic	2
Failure by farmers to meet organic quality standards	3
Lack of market information	3
Food safety issues	1
Lack of communication with farmers	1
Lower organic rewards relative to non organics	3
Marketing of organic foods	3
Rival competition	2

Note: *1 = no problem 2 = minor problem 3 = major problem*

It is evident from the rankings in tables 4.1 and 4.2 that some constraints were specific to each player, showing that communication and joint-problem solving may help to improve consensus on how to improve future performance of the formal organic crop supply chain. With better communication, and more joint-problem solving and commitment, these specific constraints will be made known to both downstream and upstream players. For instance, the retailer did not rank a lack of finance as a major constraint, yet the EFO farmers ranked it

number five. The perception of high transport cost as a major constraint was more envisaged downstream, where the retailer ranked it as major while the farmers ranked it number six. The farmers probably ranked it relatively lower because they use KZN Department of Agriculture and Environmental Affairs transport that is subsidized and that they often sell through hawkers and do not incur transport costs at all.

Perishability of crops reflects the 48 farmers' perceptions of a lack of storage facilities, implying that better storage facilities and product delivery scheduling could improve supply chain performance. Both the farmers and the retailer also cite a lack of market information as a constraint – for example, most of the farmers expressed ignorance about the characteristics of the end users of the organic crops. This suggests that more cooperation and better communication of market information - such as changing consumer demand and how crop prices are determined - between them and the other players could reduce transaction costs and improve supply chain competitiveness. While the retailer perceived the EFO organic farmers as being inflexible in meeting unexpected changes in demand, and that sometimes they fail to meet high organic standards, farmers perceived themselves as having enough information about organics. This difference in ranking of constraints again indicates that more emphasis should be placed on improving communication and cooperation in the formal KZN organic crop supply chain. In the ranking of constraints by the retailer, matters such as input costs, uncertain climate and problems in financing the inputs were excluded. These constraints are specific to the EFO farmers at farm-level, but such information will better help the retailer to understand key constraints facing the EFO farmers.

The constraints identified in Table 4.1 and those perceived by the retailer in Table 4.2 give some support to study research hypothesis H_8 specified at the beginning of this chapter. 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. The next section discusses the PCA of the 48 fully certified organic EFO farmers' ranked constraints. This helps to identify *further dimensions* of the relationships between these constraints.

4.3 Principal component analysis of EFO farmers' perceived constraints on supply chain competitiveness

The correlation matrix shown in Appendix 4 on pages 113 to 115 indicates that all of the estimated correlation coefficients between the constraint scores, except the one between uncertainty about prices received from the pack-house (UPRICEPK) and not being fully rewarded by the pack-house (NOREWARD), are less than 0.7. Following Kim & Mueller (1978), PCA can, therefore, be applied for exploratory purposes to find general clusterings of these ranked constraints as *further dimensions*. Six principal components (PCs) that explained 71.4% of the variance in the original constraint scores were extracted from the covariance matrix using the SPSS statistical package (Norusis, 1994) as reported in Table 4.3 overleaf. Koutsoyiannis (1987) suggests retaining PCs that meet Kaiser's criterion (have eigenvalues of one or above), have estimated component coefficients greater than 0.3, and can be meaningfully interpreted. Although the eigenvalues for five of the PCs in Table 4.3 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. Varimax rotation did not improve the interpretation of these PCs, and the reported PCs are thus unrotated (Norusis, 1994).

The first component (PC1) explained 27.2% of the variance in the constraint scores, with all seven estimated coefficients above 0.3 being positive. Based on the size of the estimated loadings, 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 could not find more labour to hire, and perceived that they lacked bargaining power over product 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. This component seems to capture constraints associated with "lack of market information and lack of market power". Component PC2 explained 11.7% of the variance in constraint scores, and shows 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 component could be interpreted as reflecting "crop production expansion constraints".

Component PC3 accounted for 11% of the variance in the scores for the 20 constraints, and shows that farmers who strongly perceive lack of access to more cropland probably do not lack information about producing organic crops. This dimension reflects a "commitment to crop area expansion". The fourth component, PC4 explained 8.7% of the variance in constraint rankings and implies a "lack of liquidity", as a perceived lack of full reward for crops sent to the pack-house links with a perceived lack of finance for inputs. The PC5 displays the fifth largest amount of variation (6.6%) in the farmers' rankings, and captures a "lack of proper storage facilities" constraint. Finally, PC6 is a "lack of information about alternative markets" constraint and accounted for 6.2% of the variation in the EFO farmers' scores for the constraints

Table 4.3 Principal component loadings estimated for the 48 fully certified organic EFO farmers' rankings of potential constraints in organic crop production and marketing, KwaZulu -Natal, 2004

	Component					
Component	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**PC6**
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	**0.476**	-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	**0.559**	**-0.389**	0.140	0.235	0.034	.078
Uncertain prices for products sold to other markets[1]	**0.556**	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	**0.315**	0.011	**0.325**	0.180	-0.082
Lack of information about producing organic crops	0.263	0.060	**-0.389**	0.017	0.159	0.262
Lack of information about alternative markets	0.183	0.071	**0.338**	-0.058	-0.081	**0.383**
Lack of proper storage facilities	-0.267	0.133	-0.150	0.003	**0.491**	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	**0.372**	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	**0.609**	0.209	-0.205	-0.150	-0.023	-0.118
Cannot access more cropland	0.156	**0.473**	**0.493**	-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 the pack-house	**0.466**	-0.028	0.191	-0.271	0.071	-0.164
Lack of information about consumer preferences for our organic products	**0.359**	-0.004	-0.145	-0.194	0.258	-0.010
Pack-house does not reward me fully for my own product	**0.676**	-0.279	0.005	**0.403**	.110	-0.123

The 48 EFO farmers have access to one agent in the formal organic crop supply chain and this could reduce their bargaining power. Knowledge of prices and consumer demand in alternative markets could provide more contestability in the formal organic crop supply chain that may improve price premiums and net returns for these EFO farmers. 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 the Isipingo market, do not differentiate between conventional products and organic products, thus no price premiums are captured from such markets. An understanding of the perceived constraints enables the players to make better decisions about where to allocate human and other resources in order to improve the competitiveness of this KZN formal organic crop supply chain.

4.4 Discussion and conclusion

The perceived key constraints on organic cropping that were identified may help the players to build trust and improve co-operation on where to focus resources to jointly try and manage these constraints. The 48 fully certified organic EFO farmers perceived that uncertain climate, unavailability of tractor or draught power when needed, delays in payments for crops sent to the pack-house, inputs not available at affordable prices, a lack of cash and credit to finance inputs, lack of affordable transport to market crops, more work than the family can handle, a lack of manure to purchase, and a lack of crop storage facilities and telephones to negotiate sales, were the current top 10 constraints on the competitiveness of the formal organic crop supply chain. The PCA summarized the underlying dimensions in the 20 constraints ranked by these farmers in the study as indicating "lack of market information and lack of market power"; "crop production expansion constraints"; "commitment to crop area

expansion"; "lack of liquidity"; "lack of proper storage facilities"; and "lack of information about alternative markets".

Climatic conditions are essentially 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 securing contracting services and quicker pack-house payments for organic crop deliveries are potential solutions to the second and third highest ranked constraints. Higher premiums for organic crops sold via the formal supply chain may also reduce perceptions of a lack of full reward or a lack of bargaining power. This may require that the EFO farmers and the pack-house agent interact with the retailer to promote the sales of organic crop foods amongst health conscious consumers that are willing and able to pay more for organic crops. 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 ease this constraint. Lack of liquidity may remain a constraint in the medium-term, as the EFO farmers cannot pledge land as collateral for debt finance. The concepts of interlinked contracts or liens on crops as substitutes for 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 share since 2001 indicate that their bargaining power has increased relative to the agent. More information about other possible markets and consumer preferences would enable EFO farmers to better understand organic crop quality requirements. This raises the question of who will provide

this information and whether the expected benefits from additional information will exceed the expected costs.

The finding that there is a crop production expansion constraint despite commitment to crop area expansion could identify an opportunity to actively work with members of the EFO to promote the development of land rental markets for those members that wish to expand their areas under organic crops (see Thompson & Lyne (1990) for a discussion on the process of establishing rental markets in areas like the Umbumbulu district that are characterized by communal tenure institutions). Again, the mechanics of implementing such a market in the EFO situation requires further research. This process could be assisted 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 indicated high transport costs, supplier's inflexibility, low shelf life (perishability), failure by EFO farmers to meet quality standards, sometimes lower economic rewards of organic foods compared to conventional foods, lack of information and marketing of organics as the top seven constraints limiting the competitiveness of the KZN supply chain. Uncertainty of organic supply and demand, lack of credit to finance EFO, food safety issues, lack of communication with farmers and a lack of consumer knowledge were ranked the lowest by the retailer. However, some of these ranking are specific and indicate that the retailer and the farmers need to cooperate and communicate more in order to synchronize and solve their constraints. In terms of perishability of the products, upgrading storage should start at the farm-level up to the retail level in order to increase shelf life.

Potential solutions to better manage the perceived main constraints on organic crop farming thus include: improved risk management practices (e.g. supplemental irrigation), improving access to tractor services by contracting, quicker pack-house delivery payments, access to finance and storage facilities, more interaction with the retailer to promote sales of organic crops, providing advice on how to improve bargaining power, improving quality control at departure points to eliminate "free riding" and avoid high crop consignment rejection rates, and providing more information about other markets and changing consumer preferences. Obviously, the costs and benefits of these suggestions, particularly how they will be financed, need to be evaluated.

Chapter 5 presents the analysis of MMs and relative player shares of the consumer's organic crop rand in the three organic crop supply chains accessed by the 48 EFO farmers in KZN.

CHAPTER 5

TRENDS IN MARKETING MARGINS AND SHARES OF THE CONSUMER'S ORGANIC CROP RAND SINCE 2001

This chapter reports data sources and procedures used to analyse the MMs and relative shares of the consumer's organic crop rand for the players for both the formal organic crop supply chain and the informal supply chains accessed by the 48 EFO farmers in KZN. The concluding section discusses some possible ways to improve the farmer's share and net returns for the EFO farmers in the formal organic crop supply chain.

5.1 Data sources and procedures to analyse the MMs

To analyse the organic crop formal and informal supply chain trends in MMs, data on prices and marketing costs were collected at each level of the supply chain (EFO farmers, the pack-house, hawkers and the retailer) for amadhumbes, sweet potatoes and potatoes. Farm prices were calculated from average annual prices received by the 48 fully-certified organic EFO farmers during the period 2001-2004. The EFO farmers could provide records of prices for all seasons from the beginning of 2001 for both the formal and informal supply chains. Before the farm value equivalent is calculated, it was necessary to estimate the quantity of farm products purchased from the farmers that is needed to sell a unit of the product at retail level. This quantity is usually larger than the quantity sold at retail for most foods because part of the farm product is removed in processing or is lost due to waste and spoilage in marketing. For example, the grower may sell 1,5kgs of potatoes for each kilogram of potato products (e.g. French fries) sold to consumers (Kohls & Uhl, 1988).

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, 1kg of an organic crop is transformed into approximately 1kg of the end product on a one-to-one fixed proportion basis. Production and marketing costs for all seasons since 2001 were difficult to obtain from the farmers, but 2004 season cost estimates for inputs such as draught power, manure and hired labour were available and were used to estimate net returns. Hawkers also provided selling prices for the three organic crops since 2001, but very little information on their costs was available. Marketing costs incurred by hawkers were mainly transport and storage costs, which they reported for the 2004 season, with transport costs based on an average of two orders per week for all products. This study estimates hawkers' net returns by charging them a storage cost of R3 per day and expended hired labour based on the minimum wage of R4.87 per hour for 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.

Information about the MMs and costs of the pack-house and the retailer could not be obtained due to the sensitivity of this proprietary information. However, information on the selling prices, the main costs incurred at the pack-house (labour and transport) for the 2004 season and the total units sold for each product was obtained from a consulting firm (who requested to remain anonymous) that carried out a feasibility study of the pack-house in 2004. Further cost data were collected from commercial smallholder organic crop farmers in KZN who supply similar crops to the retailer. A costing statement was prepared to apportion these costs to their relevant cost centres based on sales volume. Historical price data were estimated by deflating these prices by a vegetable consumer price index (CPI) obtained from Statistics SA

(2005) (see Appendix 5 on page 116). This index was provided on a monthly basis for the period January 2000-January 2005. The average vegetable price was then calculated from these figures on an annual basis from August each year to July of the following year to coincide with the EFO farmers' marketing season. All prices were calculated using the 2003-2004 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% that the retailer reported applies across all three products. The next step was to calculate the share of each channel player of the final retail price. To estimate MMs for the organic crops, average prices per kg collected at the farmer level and the pack-house were used. This method is used by the United States Department of Agriculture, as it is difficult to calculate 'perfect' MMs due to different product sizes and grades and other factors that affect prices (Hahn, 2004). These average prices were used to calculate the farmer's share (farm value equivalent divided by retail price), the pack-house agent MM, and the retailer MM. The same statistics for the informal supply chains were similarly estimated for comparison purposes. The method of estimating the relative shares of the consumer's organic crop rand and MMs in this study, therefore, is given below using potatoes in the 2001-2002 season as an example. The pack-house agent purchased organically-grown 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. This gave:

Farmer's share of consumer's rand for accepted produce = R2.50 (5.1)

Pack-house MM = (R5.38 – R2.50) = R2.88, and (5.2)

Retail MM = (R8.07 – R5.38) = R2.69. (5.3)

The distribution of these benefits calculated in terms of the player's share of the final price paid by the consumer for organic potatoes gave:

Farmer's share for accepted produce = (R2.50÷ R8.07) = 31% (5.4)

Pack-house share = (R2.88 ÷ R8.07) =36%, and (5.5)

Retail share = (R2.69 ÷ R8.07) = 33% (5.6)

This implies that the total MM = Pack-house MM + Retail MM = R5.57 and the total share of these marketing firms = 69%. The MMs and shares are analysed from 2001 to 2004 to identify changes in relative shares for the 48 fully certified organic EFO farmers, the pack-house agent and the retailer in section 5.2.

5.2 Trends in accounting MMs for the three organic crops since 2001

The MMs reported in Table 5.1 overleaf show the farmer's share increasing and pack-house share falling, while the retailer's share remained at 33% during 2001-2004 for all three organic crops. In the 2004 season, the pack-house share for amadhumbes and sweet potatoes fell to 22%, while the farmer's share rose to 45%. This could be attributed to continued efforts by the EFO farmers to bargain for better prices. Though the pack-house share declines for all three organic crops, the fall is relatively less for potatoes. The corresponding shares calculated for the informal supply chain shown in Table 5.2 overleaf indicate that the farmer's share declined from between 46% to 38% (sweet potatoes) and 54% to 44% (amadhumbes and potatoes) since 2001-2004, while the hawker's share increased to between 56% (amadhumbes and potatoes) and 62% (sweet potatoes). The farmer's share seems to be larger in Rand terms, but declining, in the informal organic supply chain compared to the formal organic crop

supply chain. The increasing hawkers' share is mainly a result a relatively larger increase in price at the hawkers' level compared to the rise in the farm-level price.

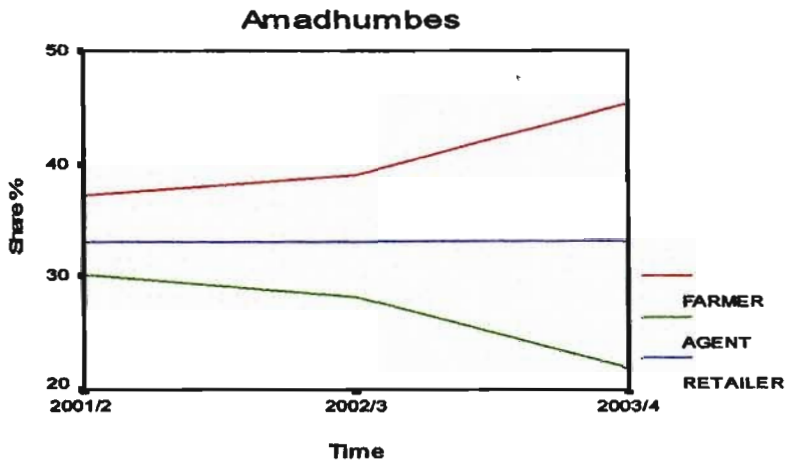
Table 5.1 Real shares of the consumer's rand for the three crops in the formal organic crop supply chain, KwaZulu-Natal, 2001-2004 (2003-2004 season = 100)

	Amadhumbes			Sweet potatoes			Potatoes		
Season	**Farmer**	**Agent**	**Retailer**	**Farmer**	**Agent**	**Retailer**	**Farmer**	**Agent**	**Retailer**
2001/02	37%	30%	33%	33%	34%	33%	31%	36%	33%
2002/03	39%	28%	33%	36%	31%	33%	33%	34%	33%
2003/04	45%	22%	33%	45%	22%	33%	35%	32%	33%

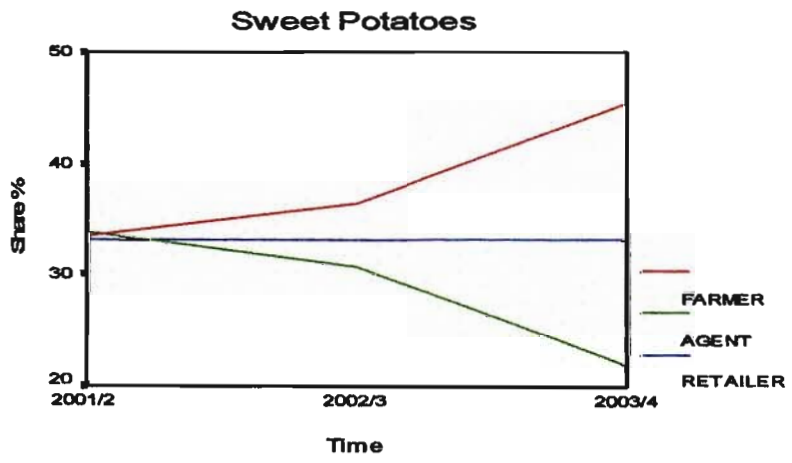
Table 5.2 Real shares of the consumer's rand for the three crops in the informal crop supply chain, KwaZulu-Natal, 2001-2004 (2003-2004 = 100)

	Amadhumbes		Sweet potatoes		Potatoes	
Season	**Farmer**	**Hawker**	**Farmer**	**Hawker**	**Farmer**	**Hawker**
2001/02	54%	46%	46%	54%	54%	46%
2002/03	45%	55%	38%	62%	45%	55%
2003/04	44%	56%	38%	62%	44%	56%

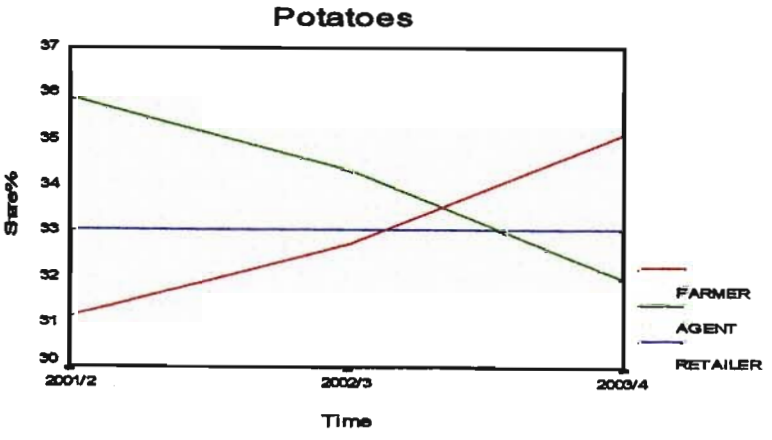
Figure 5.1 overleaf graphs trends in these shares for the formal organic crop supply chain, and Figure 5.2 on page 82 graphs these shares for the informal crop supply chains. Although the farmer's share was comparatively lower in the formal organic crop supply chain than the informal organic crop supply chain, farm prices increased more in real terms in the formal supply chain. Perhaps this shows that the EFO bargaining leverage, which could be a direct function of improved literacy and experience in trading in the formal organic crop supply chain over time, was increasing.



The farmer's share increases, while the agent's share falls and the retailer's share remained constant over the three years.

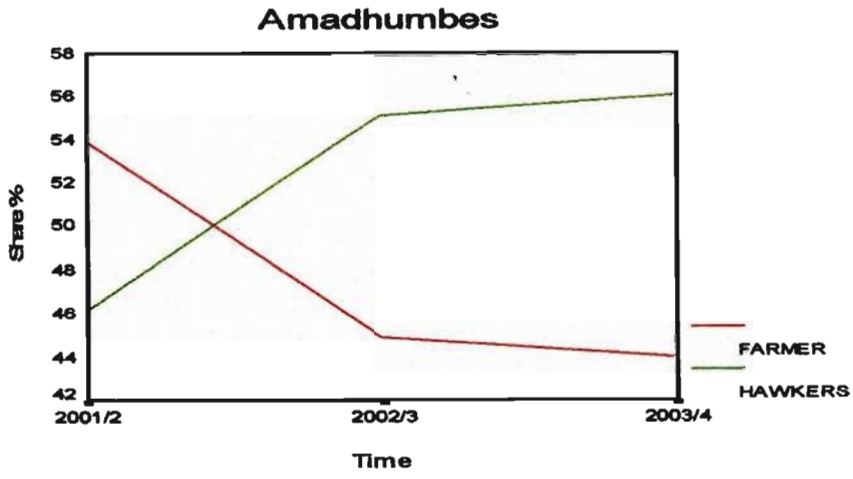


The farmer's share increases, while the agent's share falls. The retailer's share remained constant over the three years.

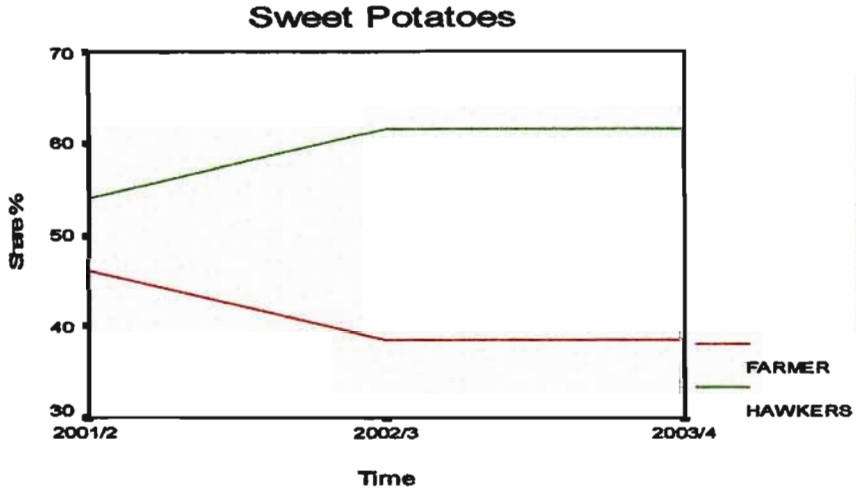


Initially, the agent's share falls, while the farmer's share rises. The retailer's share remained constant over the three years.

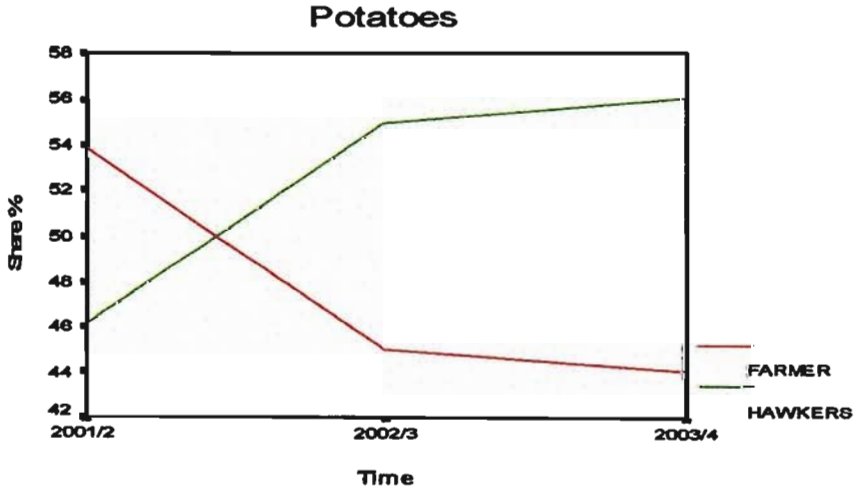
Figure 5.1: Percentage shares of the formal organic crop supply chain, KwaZulu Natal, 2001-2004



The farmer's share is initially higher and then falls. Hawker's share increases.



The farmer's share is lower from 2001, fell in 2002 and remained steady. Hawker's share is higher and increases initially but remains higher and constant from 2002



The farmer's share is initially higher and then falls, while the hawker's share rises

Figure 5.2: Percentage shares of the informal organic crop supply chain, KwaZulu Natal, 2001-2004

The literature on MMs indicates that little can be concluded about margins unless information about marketing costs is available. Increases in MMs due to increases in marketing costs may not mean increases in profits made by the players in a supply chain. Moreover, where farmers receive only a comparatively small share of the selling price, this does not necessarily mean that their welfare has declined (Tomek & Robinson, 2003; Hahn, 2004). The MMs will depend on the length of the marketing chain and the extent to which the product is stored, processed or has added services – implying that marketing costs need to be analysed in more detail. Information on marketing costs was introduced to add more meaning to the reported price spreads, and produce net returns (selling price minus the direct and indirect costs of production) in Appendix 8 on page 119 that are summarized in Table 5.3. 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.

Table 5.3 Accounting net returns (in Rand) for different players in the three organic crop supply chains, KwaZulu-Natal, 2004

Supply Chain Player	Amadhumbes (R)	Sweet Potatoes (R)	Potatoes (R)
Pack-house	1.51	1.50	2.79
Hawkers	1.71	2.07	1.71
EFO farmers selling to pack-house	0.85	1.44	1.15
EFO farmers selling to hawkers	1.42	1.65	2.01

The costs were only collected for the 2004 season as the EFO farmers and hawkers did not have detailed long-term records, and also because the pack-house agent and the retailer considered this information as confidential and would not provide any data. The hawkers seem to capture the highest net return per kg for amadhumbes (R1.71) and sweet potatoes (R2.07), while the pack-house has the highest net return per kg for potatoes (R2.79). The 48

EFO farmers received comparatively lower net returns per kg across all three crops in the formal organic crop supply chain, and for amadhumbes and sweet potatoes in the informal crop supply chain. Labour and transport costs are less for the EFO farmers when selling to hawkers, which make their net returns higher for all three crops in the informal crop supply chain compared to the formal supply chain (hawkers incur the harvesting, cleaning and transport costs as they collect the crops from the EFO members' fields). There is, however, no guarantee that the hawkers will purchase all of the crop volumes produced, thus introducing uncertainty for the EFO members. Also the hawkers do not face the formal organic crop supply chain quality standards set by the retailer in the handling and marketing of the crops.

The EFO members probably still market via the pack-house, despite lower relative accounting net returns, due to the 'hidden (non-quantified) benefits' provided by the pack-house agent in terms of past help in securing tractor services and fencing, and currently facilitating access to the retailer. Also, the formal organic crop supply chain is a relatively lower risk-low return selling channel option for the EFO farmers, since they agree with the pack-house agent on a guaranteed minimum price for the season, though prices tend to vary above this minimum level. While the agent has reduced transaction costs for the EFO farmers in locating a buyer for their organic crops, the agent seems to have created some further price uncertainty for these farmers despite the guaranteed minimum price agreed to at the start of the season.

5.3 Discussion and conclusion

The calculated MMs over the period 2001-2004 indicate that farmer's share of the consumer's Rand increased over time, but when actual accounting costs were factored into the EFO farmers' net margins, the share was lower than that of the other supply chain players.

Informal supply chain net returns for the 48 EFO farmers were relatively higher than those for the formal organic crop supply chain. The packer captures most of the accounting profits in the marketing of potatoes, while the hawkers capture most of the profits for the other two crops. A potential solution to improve the formal organic crop supply chain competitiveness is by reducing transaction costs (Ruijs *et al.,* 2004) for EFO farmers via, for example, vertical cooperation with the marketing firms or increasing horizontal cooperation through producer groups. However problems of 'free riding' may arise due to non-proportional property rights (Ortmann, 2005). According to the retailer, the market for organic crops in KZN and SA is still new; therefore, marketing and advertising the benefits of consuming organics need to be further pursued.

The EFO farmers' net returns may also be improved by lowering operating costs to capture more of the potential price premium for organic crops. Improved access to other formal value-added organic crop supply chains might increase the likelihood of capturing organic crop price premiums. The EFO farmers may also want to consider performing some of the marketing services themselves e.g., cleaning, grading, packaging etc. if they have the skills and can improve access to finance. There are, however, "hidden benefits" from maintaining the formal organic crop supply chain relationship, as the pack-house agent has in the past helped to secure tractor services and fencing for the EFO members, and currently facilitates access to the retailer. These benefits, however, are in part offset by the additional price uncertainty that the agent appears to have created (despite agreeing to pay guaranteed minimum prices for the organic crops).

CONCLUSION

The relational view of competitive advantage contends that players in a supply chain must consider appropriate ways to link their human resources with those of upstream and downstream partners to create competitive advantage for mutual benefit. The first recursive model of the working relationship between the 48 fully certified organic EFO farmers and the pack-house agent in this study showed that higher levels of overall relationship satisfaction and, hence, more trust, led to more cooperation (joint-problem solving and more communication) between these players. More cooperation encouraged the 48 farmers to commit greater levels of human resources to the working relationship. The second recursive model (KMV Model) showed that higher levels of overall relationship satisfaction and, hence, more trust, led to greater commitment towards the working relationship, which resulted in more cooperation between the 48 farmers and the agent.

The simultaneous-equation model combining the two recursive models required more explanatory variables in order to identify the individual equations. After adding variables to represent the costs of maintaining the supply chain relationship and relative price uncertainty, the estimated simultaneous-equation model indicated that higher levels of satisfaction lead to higher levels of trust that, in turn, promote cooperation and commitment by EFO members in the formal organic crop supply chain. Higher perceived costs of maintaining the working relationship and more relative price uncertainty, respectively, reduce levels of cooperation and commitment. There is also evidence of a two-way relationship between cooperation and commitment.

Results also show that the EFO farmers and the pack-house agent could cooperate more in production planning, harvest scheduling and new product planning to make the formal organic

crop supply chain more competitive. These efforts can be assisted if the players communicate more about what are, and how to overcome, the perceived key constraints that limit competitiveness in a market characterised by the farmer's uncertainty about the prices for organic crops (despite a guaranteed minimum price). Also, overall relationship satisfaction may be improved by introducing an EFO "empowerment label" that better identifies their crop products to consumers that are willing and able to pay more for such items. It is recommended that evaluation and rating systems of the EFO farmers be kept as objective as possible and that all parties share information about purchasing decision criteria. The pack-house agent could better inform EFO members about organic crop quality standards and why deliveries are sometimes rejected. Relationship maintenance costs may in part be offset if the EFO farmers are assisted in bargaining for higher prices for the crops they sell to the pack-house through actions such as remedial instruction to improve their literacy.

Satisfaction and, hence, trust, cooperation and commitment may be improved by adopting a formal written contract between the EFO farmers and the pack-house. The purpose of a contract is to facilitate trade between the parties who must make relationship specific investments. The current EFO contract is incomplete and may negatively affect the working relationship with the pack-house by providing scope for opportunistic behaviour. A formal contract written in IsiZulu could help to better inform the 48 EFO farmers who on average have relatively low levels of literacy (about five years of schooling). However, it is not possible to allow for all potential contingencies, but these EFO farmers and the pack-house agent could improve the situation by building into the contract mechanisms for revising the terms of trade as each player receives more information about costs and benefits. Some matters that may be addressed in a formal written contract are: communication systems, for example, a provision for regular meetings; renegotiations of trading terms so that the farmers can benefit from the positive crop price

changes; handling procedures for rejected produce and the pricing mechanism to be used thereafter for that produce; procedures for paying farmers; mechanisms for tracing quality to a specific farmer; and penalties for breaching the contractual arrangements.

Overall relationship satisfaction, trust, cooperation and commitment could be improved by the players working together to overcome key constraints that are perceived to affect the competitiveness of the formal organic crop supply chain. The EFO farmers identified the top 10 constraints as uncertain climate, unavailability of tractor or draught power, delays in payments for crops sent to the pack-house, lack of affordable inputs (particularly labour and manure), a lack of cash and credit to finance inputs, lack of affordable transport, more work than the family can handle, unavailability of manure to purchase, and lack of proper storage facilities and telephones to negotiate sales. Principal component analysis identified six further underlying dimensions in the constraints perceived by the 48 fully certified organic EFO farmers as a lack of market information and power; crop production expansion constraints (in addition to evidence of a commitment to crop area expansion); a lack of liquidity; lack of proper storage facilities; and lack of information about alternative markets. The retailer cited high transport costs, the farmers' inflexibility to meet changing consumer demand for organic crops, perishability of the crops, failure by farmers to meet organic quality standards, lack of market information, lower organic rewards relative to non organics and problems in marketing organic foods as key constraints.

Potential solutions to overcome the constraints identified in this study include the development of supplemental irrigation, water-harvesting or the use of small boreholes; increasing interaction with the retailer to promote the sales of organic crops; providing advice on how the EFO farmers could improve their bargaining power; providing more information about other markets and consumer preferences; improving access to tractor services through improved scheduling and

(possibly) the use of local tractor contracting services; improving crop quality inspection at the EFO farm-level departure points to avoid relatively high consignment rejection rates and eliminate free riding by some farmers; and the development of a land rental market. The management implication is that, over time, the players must learn more about the external and internal environment in which the formal organic supply chain in KZN operates, each other's business, and the key sources of risk associated with their investments. They are then likely to be more committed to re-evaluate their linkages and work together to overcome the constraints, thus implementing necessary changes to make the supply chain more competitive. Obviously, the costs and benefits of these proposals need to be researched further. More research is also needed to assess the pack-house agent and retailer's perceptions about satisfaction, trust, cooperation and commitment in the formal organic crop supply chain. Together with more information on the constraints that are perceived by the pack-house agent, this would provide more perspective on how to improve the competitiveness of the formal organic crop supply chain.

Managing key constraints in the formal organic crop supply chain also presents opportunities to improve net returns from trading. The real farmer's share estimated for the 48 fully certified organic EFO farmers increased for all three crops during 2001- 2004. When actual accounting costs were factored in, the net returns for these farmers were lower across all crops in the formal and informal supply chains. The EFO farmers could consider accessing alternative markets where consumers are willing and able to pay price premiums for the quality organic crops, or carrying out some of the marketing services if they can perform them at lower cost than the other players (e.g. cleaning, grading, and packing). Farmer's net returns may also be improved by lowering operating costs and by aggressive marketing in cooperation with the retailer to capture potential price premiums.

Although this study shows that farmers' net returns have been relatively low despite an increasing farmer's share for the three crops since 2001, further research on the full (accounting and economic) costs and benefits associated with participating in these supply chains is needed. A large sample with quarterly data might more accurately reflect actual prices received for crop deliveries to the pack-house. Further analysis of the power relations that exist between the partners is needed. For example, the EFO farmers' lack of relative bargaining power may, in part, be responsible for perceived relatively low price premiums paid for crops by the pack-house agent. Finally, exploring the impact (if any) of risk-aversion on cooperation and commitment would extend the study. For example, it is possible that the more risk averse are the players, the more they are likely to cooperate and commit themselves to making their supply chain working relationship sustainable.

SUMMARY

A marked increase in consumer demand for healthier foods in South Africa (SA) since 1999 has led local supermarket chains to look for new sources of organically (chemical-free) produced foods. This may present opportunities for limited resource, smallholder farmers who already practice organic farming methods to earn higher incomes by producing crops for this niche market. Research on ways to integrate smallholder farmers into such markets can, in turn, help to improve knowledge management, raise household incomes and stimulate economic growth. These outcomes would also help to develop sustainable rural livelihoods and to contribute to alleviating rural poverty. This requires analyzing organic crop supply chains in order to identify key relationship aspects that need to be better managed, and what links need to be strengthened.

This study uses a census survey of 48 fully certified organic farmers who were members of the Ezemvelo Farmers' Organization in the Umbumbulu district of KwaZulu-Natal during October-November 2004 to (1) analyse key working relationships between these farmers and the pack-house agent in the formal organic crop supply chain that they access to market amadhumbes (a traditional vegetable tuber), potatoes, and sweet potatoes. The pack-house agent sells the crops on their behalf to a major nationwide supermarket chain, and they also market these crops via informal supply chains to neighbours and hawkers; (2) document the EFO farmers' perceptions of factors that constrain the competitiveness of the formal crop supply chain; and (3) estimate marketing margins (MMs) and real shares of the consumer's organic food rand in the three supply chains since 2001.

The 48 fully certified EFO organic farmers were personally interviewed to obtain information about (a) their overall satisfaction with the agent; (b) the degree of trust; (c) their levels of cooperation (joint-problem solving and communication) and cooperation in the production planning, harvesting, scheduling, marketing of the organic produce and quality control; (d) their levels of commitment; and (e) their perceptions of the main constraints that limit the competitiveness of the formal organic crop supply chain .

Two conceptual models of the working relationship between the 48 EFO farmers and the pack-house agent were developed from past research conducted in South Africa, the USA, Europe and Australia to highlight the role of satisfaction, trust, cooperation and commitment in promoting supply chain competitiveness. The study then extends past local and international research on supply chain analysis by combining the two conceptual models into a simultaneous-equation model of these behavioural aspects. The empirical results obtained from the two recursive models and the simultaneous-equation model indicate that higher levels of satisfaction lead to higher levels of trust that, in turn, promote cooperation and commitment by EFO farmers in the formal organic crop supply chain. Higher perceived costs of maintaining the working relationship and more price uncertainty, respectively, reduce levels of cooperation and commitment. There also seems to be a two-way, or simultaneous, relationship between cooperation and commitment. The farmers and agent could cooperate more in the planning of new products to grow and market, and to remove price uncertainty by giving EFO members more information about prices that the pack-house will pay.

The study recommends, as a way to improve satisfaction and hence trust, cooperation and commitment, adopting a more formal contract between the EFO farmers and the pack-house agent to replace the current incomplete verbal contract. This contract could be written in IsiZulu

to benefit the EFO farmers who on average have relatively low levels of literacy (mean of about five years of schooling). Some of the clauses that need to be in a formal contract include: systems to improve communication, for example, regular meetings; how to deal with over or undersupply of crops by EFO farmers; renegotiations of trading so that the farmers can benefit from the positive price changes for organic crops; handling procedures for rejected produce and the pricing mechanism to be used thereafter for that produce; procedures for paying farmers more quickly by the pack-house agent; mechanisms for tracing quality to individual farmers; and penalties for breaching the contractual arrangements.

The process of building trust, cooperation and commitment in a supply chain will be enhanced if the players monitor changes in the external and internal environment, and evaluate the risks that they face due to participating in the supply chain. This helps them to identify key constraints on supply chain competitiveness over time, and how best to try and adjust to, and to manage, these constraints for mutual benefit. The EFO farmers ranked uncertain climate, unavailability of tractor or draught power, delays in payments for crops sent to the pack-house, lack of affordable inputs (particularly labour and manure), a lack of cash and credit to finance inputs, lack of affordable transport, more work than the family can handle, unavailability of manure to purchase, and lack of proper storage facilities and telephones to negotiate sales as their top 10 constraints.

Principal Components Analysis identified six further underlying dimensions in the 20 constraints that the 48 EFO farmers evaluated as reflecting a lack of market information and lack of market power; crop production expansion constraints; a commitment to crop area expansion; lack of liquidity; lack of proper storage facilities; and a lack of information about alternative markets. The retailer identified major constraints as high transport costs, farmers'

inflexibility in responding to changing consumer demand, the perishability of organic crops, failure by farmers to meet organic quality standards, lack of market information, lower returns for organics relative to non-organic products after taking perishability into account, and problems in marketing of organic foods, as top constraints.

Potential solutions to overcome the constraints identified in this study include the development of supplemental irrigation, water-harvesting or the use of small boreholes; increasing interaction with the retailer to promote the sales of organic crops; providing advice on how the EFO farmers could improve their bargaining power; providing more information about other markets and consumer preferences; improving access to tractor services through improved scheduling and (possibly) the use of local tractor contracting services; improving crop quality inspection at the EFO farm-level departure points to avoid relatively high consignment rejection rates and eliminate free riding by some farmers; and the development of a land rental market. Obviously, the costs and benefits of these proposals need to be researched further. More research is also needed to assess the pack-house agent and retailer's perceptions about satisfaction, trust, cooperation and commitment in the formal organic crop supply chain. Together with more information on the constraints that are perceived by the pack-house agent, this would provide more perspective on how to improve the competitiveness of the formal organic crop supply chain.

In order to analyze the trends in marketing margins, prices and marketing costs were collected at each level of the supply chain (EFO farmers, the pack-house and the retailer) for amadhumbes, sweet potatoes and potatoes. Farm prices were calculated from average annual prices received by EFO farmers during the period 2001-2004. Marketing costs incurred by hawkers were mainly transport and storage costs, which they reported for the 2004 season. Historical price data were

then estimated by deflating the 2004 prices by a vegetable consumer price index (CPI) obtained from Statistics SA (2005). Historical retail prices were estimated using a margin between the retail price and the price paid to the pack-house of 33% that the retailer reported applied across all the three products. To estimate MMs for the crops, average prices collected at the farmer level, the pack-house and the retailer were used.

Study results for the period 2001-2004 estimate that the farmer's share of the consumer's organic crop rand increased over time, but when actual accounting costs were factored in, farmers' net returns were generally lower compared to other players. In addition, net returns for the 48 EFO farmers from the informal supply chain were higher than for the formal supply chain. The packer captures most of the net returns in the marketing of potatoes and the hawkers in the other two crops.

The EFO farmers' net returns may also be improved by lowering operating costs to capture more of the potential price premium for organic crops. Improved access to other formal value-added organic crop supply chains might increase the likelihood of capturing organic crop price premiums. The EFO farmers may also want to consider performing some of the marketing services themselves, e.g. cleaning, grading, packaging etc., if they have the skills and can improve access to finance. There are, however, "hidden benefits" from maintaining the formal organic crop supply chain relationship, as the pack-house agent has in the past helped to secure tractor services and fencing for the EFO members, and currently facilitates access to the retailer. These benefits, however, are in part offset by the additional price uncertainty that the agent appears to have created (despite agreeing to pay guaranteed minimum prices for the organic crops).

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APPENDICES

Appendix 1: Questions used to capture the 48 KwaZulu-Natal EFO farmers' perceptions about the levels of satisfaction, trust, cooperation (joint-problem solving and communication) and commitment in their working relationship with the packer.

To what extent do you **agree or disagree** with the following statements about your **working relationship with the agent** at the pack-house?

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Trust:				
We have a strong personal confidence in each other				
We have a strong business confidence in each other				
We can always rely on each other when it counts				
This agent will work hard in the future to maintain a close relationship with EFO				
I am very confident that this relationship will continue in the future				
This agent is trustworthy				
This agent has always been fair in his negotiations with us				
Communication:				
We often discuss issues such as changes in customers needs for organic products				
We have extensive formal communications				
We have extensive informal communications				
We discuss only need-to-know information that relates directly to our relationship				
We make joint decisions about:				
Reducing costs in the pack-house				
Organic product delivery scheduling				
Organic product quality control				
Improving organic product quality				
New organic products to grow				
Commitment:				
We work together to achieve productivity gains from which we both benefit				
We devote considerable time to trying to improve this relationship				
We devote considerable time trying to improve pack-house productivity				
We have made major changes in our delivery schedule in order to deal more effectively with the pack-house				

How **satisfied** are you with your **working relationship with the agent** at the pack-house over the last season (tick where appropriate)?

Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied

Why?_____

_____

Questions used to capture the 48 KwaZulu-Natal EFO farmers' perceptions about the levels of cooperation in key crop production and marketing activities with the pack-house agent in the organic crop supply chain.

How do you describe the **level of cooperation** between **you and the agent** at the pack-house in the following activities (tick where appropriate):

Activity	Very High	High	Moderate	Low	Very Low
Organic crop production planning					
Organic crop harvest scheduling					
Organic crop marketing					
Organic crop quality control					
Planning to produce new organic crops					

Appendix 2: Questions used to capture the 48 KwaZulu-Natal EFO farmers' perceptions about relationship maintenance costs incurred by being an EFO member in the formal organic crop supply chain.

What **costs** does EFO **actually** impose on you? Rank perceived costs from **1 to 4**, where **1 is no cost and 4 is excessive cost** (tick where appropriate):

	1 None	**2 Some**	**3 Reasonable**	**4 Excessive**
Cost item				
Membership fees				
Time attending meetings				
More work effort in crop production				
Increased expenditure on hired labour and other farm inputs				
Other: Please specify				

Appendix 3: List of 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** 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				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							

Appendix 4: Correlation matrix for the 20 potential constraints that limit the competitiveness of the formal organic crop supply chain accessed by EFO farmers, KwaZulu-Natal, 2004.

Please note the following key presents abbreviations for the 20 potential constraints that are presented in the correlation matrix

4.1 Key to constraint abbreviations

ABBREVIATION	Potential constraint
STOCKDAM	Livestock damage crops
UCLIMATE	Uncertain climate (e.g. drought)
UPRICEPK	Uncertain prices for products sold to pack-house
UPRICEOT	Uncertain prices for products sold to other markets
MOREWORK	More work than the family can handle
LACKCASH	Lack of cash and credit to finance inputs
LACKINFA	Lack of information about alternative markets
LACKINFM	Lack of information about producing organic crops
LACKSTOR	Lack of proper storage facilities
LACKTRAN	Lack of affordable transport for products
LACKPHON	Lack of telephones to negotiate sales
INPTNAF	Inputs not available at affordable prices
TRACTNA	Tractor is not available when I need it
NOMANURE	Cannot find manure to purchase
NOLABOUR	Cannot find labour to hire
NOCPLAND	Cannot access more cropland
PDELAYS	Delays in payment for products sent to pack-house
LACKBP	Lack of bargaining power over product prices at the pack-house
LACKCPF	Lack of information about consumer preferences for our organic products
NOREWARD	Pack-house does not reward me fully for my own product

4.2 Correlation coefficients

	STOCKDAM	UCLIMATE	UPRICEPK	UPRICEOT	MOREWORK	LACKCASH
STOCKDAM	1.00					
UCLIMATE	-0.09	1.00				
UPRICEPK	-0.12	0.23	1.00			
UPRICEOT	0.09	0.18	0.36*	1.00		
MOREWORK	0.35*	-0.10	0.04	0.11	1.00	
LACKCASH	0.12	-0.06	-0.17	-0.02	0.18	1.00
LACKINFA	0.26	-0.01	0.18	0.15	0.23	-0.08
LACKINFM	0.17	0.32*	0.18	0.32*	-0.13	-0.16
LACKSTOR	-0.10	-0.10	-0.32*	-0.24	-0.11	0.29*
LACKTRAN	0.00	-0.08	-0.14	0.01	0.11	-0.13
LACKPHON	0.35*	-0.11	0.29*	0.35*	0.05	0.00
INPTNAF	0.08	-0.07	-0.10	0.05	0.30*	0.49**
TRACTNA	0.00	-0.04	-0.25	-0.09	0.05	0.42**
NOMANURE	-0.17	0.40**	-0.10	-0.17	0.02	0.29*
NOLABOUR	0.30*	-0.23	0.32*	0.54**	0.16	-0.08
NOCPLAND	0.09	0.19	0.04	0.21	-0.03	0.24
PDELAYS	-0.08	-0.06	0.02	-0.02	0.31*	0.17
LACKBP	0.13	-0.18	0.25	0.35*	-0.12	-0.27
LACKCPF	0.08	-0.14	0.31*	0.38**	0.09	-0.14
NOREWARD	0.07	-0.17	**0.75****	0.29	0.13	-0.04

Note: ** *Denotes statistically significant at the 1% level (2-tailed).*
* *Denotes statistically significant at the 5% level (2-tailed).*

4.2 Correlation coefficients continued

	LACKINFA	LACKINFM	LACKSTOR	LACKTRAN	LACKPHON	INPTNAF	TRACTNA
LACKINFA	1.00						
LACKINFM	-0.06	1.00					
LACKSTOR	0.10	-0.16	1.00				
LACKTRAN	0.18	-0.03	0.27	1.00			
LACKPHON	0.26	0.18	-0.09	-0.10	1.00		
INPTNAF	-0.03	-0.18	-0.04	-0.12	0.03	1.00	
TRACTNA	-0.11	-0.24	0.40**	0.00	-0.08	0.38**	1.00
NOMANURE	-0.09	0.15	0.06	-0.19	-0.01	0.19	0.05
NOLABOUR	0.37**	0.02	-0.21	-0.04	0.36*	-0.07	0.00
NOCPLAND	-0.12	0.20	0.02	-0.27	0.15	0.01	0.16
PDELAYS	-0.02	0.22	0.04	0.06	-0.18	0.00	-0.09
LACKBP	0.11	0.25	-0.32*	-0.26	0.30*	-0.15	-0.21
LACKCPF	0.35*	0.03	0.04	0.01	0.29*	-0.25	0.07
NOREWARD	0.18	0.04	-0.23	-0.10	0.49**	0.07	-0.07

Note: ** *Denotes statistically significant at the 1% level (2-tailed).*
* *Denotes statistically significant at the 5% level (2-tailed).*

4.2 Correlation coefficients continued

	NOMANURE	NOLABOUR	NOCPLAND	PDELAYS	LACKBP	LACKCPF	NOREWARD
NOMANURE	1.00						
NOLABOUR	-0.37*	1.00					
NOCPLAND	0.20	0.18	1.00				
PDELAYS	0.39*	-0.12	0.09	1.00			
LACKBP	-0.22	0.28	0.18	-0.10	1.00		
LACKCPF	-0.32*	0.47**	0.03	-0.05	0.44**	1.00	
NOREWARD	-0.12	0.44**	0.03	0.08	0.32*	0.33*	1.00

Note: ** *Denotes statistically significant at the 1% level (2-tailed).*
* *Denotes statistically significant at the 5% level (2-tailed).*

Appendix 6: EFO Formal Organic Crop Supply Chain Real Price Spreads, KwaZulu-Natal, 2001-2004 (2003-2004 = 100)

A. AMADHUMBES

Year	Farm price/kg	Farmer's share	Pack-house price/kg	Pack-house share	Retailer's price/kg	Retailer's share
2001-2	2.50	37%	4.53*	30%	6.76**	33%
2002-3	3.00	39%	5.17*	28%	7.72**	33%
2003-4	3.64	45%	5.39	22%	8.04	33%

B. SWEET POATOES

Year	Farm price/kg	Farmer's share	Pack-house price/kg	Pack-house share	Retailer's price/kg	Retailer's share
2001-2	2.25	33%	4.53*	34%	6.76**	33%
2002-3	2.80	36%	5.17*	31%	7.72**	33%
2003-4	3.64	45%	5.39	22%	8.04	33%

C. POTATOES

Year	Farm price/kg	Farmer's share	Pack-house price/kg	Pack-house share	Retailer's price/kg	Retailer's share
2001-2	2.50	31%	5.38*	36%	8.03**	33%
2002-3	3.00	33%	6.14*	34%	9.16**	33%
2003-4	3.35	35%	6.40	32%	9.55	33%

Note: * Prices calculated based on the vegetable consumer price index extracted from Statistics SA (2005) with 2003-4 as the reference year (see Appendix 2).

**Prices calculated based on the margin of 33% between the selling price and the price paid to the pack-house agent as provided by the retailer.

Appendix 7: Real Shares of the Consumer's Rand for the Three Crops in the Informal Crop Supply Chain, KwaZulu-Natal, 2001-2004 (2003-2004 = 100)

A. AMADHUMBES

Year	Farm price/kg	Farmer's share	Hawker's price*	Hawker's share
2001-2	2.50	54%	4.64	46%
2002-3	2.50	45%	5.57	55%
2003-4	2.86	44%	6.50	56%

B. SWEET POTATOES

Year	Farm price/kg	Farmer's share	Hawker's price*	Hawker's share
2001-2	2.14	46%	4.64	54%
2002-3	2.14	38%	5.57	62%
2003-4	2.50	38%	6.50	62%

C. POTATOES

Year	Farm price/kg	Farmer's share	Hawker's price*	Hawker's share
2001-2	2.50	54%	4.64	46%
2002-3	2.50	45%	5.57	55%
2003-4	2.86	44%	6.50	56%

Note: **Prices collected from Hawkers at Isipingo, South Coast Market, KwaZulu-Natal.*

Appendix 8: Estimated Accounting Net Returns, 2003-2004, KwaZulu-Natal

A. PACK-HOUSE NET RETURNS

	Amadhumbes	Sweet Potatoes	Potatoes
Selling price/kg	5.39	5.39	6.40
Less Farm price per kg	3.64	3.64	3.35
	1.75	**1.75**	**3.05**
Less Labour cost/kg	0.12	0.12	0.12
Less Transport cost/kg	0.14	0.14	0.14
Estimated net return/kg	**1.50**	**1.50**	**2.79**

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

	Amadhumbes	Sweet Potatoes	Potatoes
Selling price/kg	6.50	6.50	6.50
Less Farm price/kg	2.86	2.50	2.86
	3.64	**4.00**	**3.64**
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
Estimated net return/kg	**1.71**	**2.07**	**1.71**

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

	Amadhumbes	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
Estimated net return/kg	**0.85**	**1.44**	**1.15**

D. EFO FARMERS' NET RETURNS SELLING AS HAWKERS

	Amadhumbes	Sweet Potatoes	Potatoes
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
Estimated net return/kg	**1.42**	**1.65**	**2.01**